T 335
.M958

THE LIBRARY OF CONGRESS

THE

UNITED STATES

PATENT LAW.

INSTRUCTIONS

How to Obtain Letters Patent

FOR NEW INVENTIONS:

INCLUDING A VARIETY OF USEFUL INFORMATION CONCERNING THE RULES AND PRACTICE OF THE PATENT-OFFICE; HOW TO SELL PATENTS; HOW TO SECURE FOREIGN PATENTS; FORMS FOR ASSIGNMENTS AND LICENSES; TOGETHER WITH ENGRAVINGS AND DESCRIPTIONS OF THE CONDENSING STEAM-ENGINE, AND THE PRINCIPAL MECHANICAL MOVEMENTS, VALUABLE TABLES, CALCULATIONS, PROBLEMS, ETC., ETC.

BY

MUNN & CO., SOLICITORS OF PATENTS,

No. 37 Park Row, New-York.

New-York:

PUBLISHED BY MUNN & CO., AT THE OFFICE OF THE SCIENTIFIC AMERICAN,

No. 37 PARK ROW.

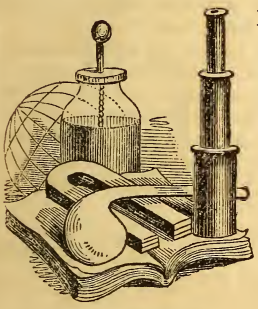
1865.

JOHN A. GRAY & GREEN, PRINTERS.

ENTERED, according to Act of Congress, in the year 1865, by
MUNN & CO.,
in the Clerk's Office of the District Court of the United States for the
Southern District of New-York.

T335
.M958

HOW TO INVENT.



IF we were asked to point out the course of life, business, or enterprise upon which any man of ordinary gifts might enter, with the best prospects of speedy success, we should unhesitatingly direct him to *invention*. Many and wonderful have been the achievements of modern genius. But the realm of invention is absolutely exhaustless, and only its outer edges have been explored. The world has yet to witness the most astounding triumphs of mind over matter.

It is a popular error to suppose that much knowledge, painful effort, constant disappointment, and many wearisome failures are the necessary preliminaries to an inventor's success. True, there are individual examples of this kind; they are exceptions.

It may be affirmed as the general rule, that inventors make money more quickly, more easily, and with less expenditure of thought, capital, or labor, than any other class of men.

It may also be affirmed that industrial enterprises and speculations which are connected with the development and introduction of new inventions are among the most sure and *profitable* investments that can be made.

The readiest way to invent is to *keep thinking*. In order to supply the mind with a constant succession of subjects, the inventor should cultivate habits of *observation*. Keep your eyes and ears open. Examine things about you, and seek to know how they are made, and how improved.

The young inventor should acquire a knowledge of the general laws and principles of natural philosophy, chemistry, and all of the sciences.

Leisure hours might be occupied with drawing and with books suggestive of improvements. To avoid waste of time in reproducing old devices, the inventor should be well posted in regard to inventions that have already been patented. For this purpose, an attentive study of *The Scientific American* will be almost indispensable.

The Boston *Journal* makes the following useful remarks: "Of course, in order to succeed, a new invention must be superior to any thing that has preceded it, and must be sold at a price that will enable it to be brought into general use. People cannot afford to throw away old implements unless the new ones are enough better to make up for the loss. Let inventors produce a good article, at a moderate price, and they will be sure of success."

SMALL INVENTIONS MOST PROFITABLE.

In an official report of a Chief Examiner of the United States Patent Office, we find the following: "A patent, if it is worth any thing, when properly managed, is worth and can easily be sold for from ten to fifty thousand dollars. These remarks only apply to patents of minor or ordinary value. They do not include such as the telegraph, the planing-machine, and the rubber patents, which are worth millions each. A few cases of the first kind will better illustrate my meaning.

"A man obtained a patent for a slight improvement in straw-cutters, took a model of his invention through the Western States, and after a tour of eight months, returned with forty thousand dollars in cash, or its equivalent.

"Another inventor obtained extension of a patent for a machine to thresh and clean grain, and sold it, in about fifteen months, for sixty thousand dollars. A third obtained a patent for a printer's ink, and refused fifty thousand dollars, and finally sold it for about sixty thousand dollars.

"These are ordinary cases of minor invention, embracing no very considerable inventive powers, and of which hundreds go out from the Patent Office every year. Experience shows that the most profitable patents are those which contain very little real invention, and are to a superficial observer of little value."

HOW TO OBTAIN PATENTS.

THE first inquiry that presents itself to one who has made any improvement or discovery is: "Can I obtain a Patent?" A *positive* answer can only be had by presenting a complete application for a Patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After a season of great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning.

If the parties consulted are honorable men, the inventor may safely confide his ideas to them; they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

We (MUNN & Co.) have been actively engaged in the business of obtaining patents for about twenty years. Many thousands of inventors have had benefit from our counsels. More than one third of all patents granted are obtained by us.

Those who have made inventions and desire to consult with us, are cordially invited to do so. We shall be happy to see them in person at our office, or to advise them by letter or through THE SCIENTIFIC AMERICAN. In all cases they may expect from us an *honest opinion*. For such consultations, opinion, and advice, *we make no charge*. A pen-and-ink sketch and a description of the invention should be sent, together with stamps for return postage. Write plain; do not use pencil nor pale ink; be brief.

All business committed to our care, and all consultations, are kept by us *secret and strictly confidential*. Address MUNN & Co., 37 Park Row, New-York.

SPECIAL EXAMINATIONS.

FEE $5.

IN many cases it will be advisable, as a measure of prudence, to order a PRELIMINARY EXAMINATION. This consists of a *special search*, made at the U. S. Patent Office, Washington, through the medium of our house in that city, to ascertain whether, among all the thousands of patents and models there stored, any invention can be found which is similar in character to that of the applicant. On the completion of this special search we send a *written report* of the result to the party concerned, with suitable advice. Our charge for this service is $5.

If the device has been patented, the time and expense of constructing models, preparing documents, etc., will, in most cases, be saved by means of this search; if the invention has been in part patented, the applicant will be enabled to modify his claims and expectations accordingly.

Many other obvious advantages attend Preliminary Examination, although the strictest search does not always enable the applicant to know absolutely, whether a patent will be granted.

For example, applications for patents are sometimes rejected because the Examining Officer finds a description of the alleged invention in some foreign publication; or some other person has been previously rejected on an analogous device; or some other invention, for a similar purpose, partially resembles the applicant's in its construction; or the Government makes an unjust or uncommon decision. Against none of these contingencies does the Preliminary Examination provide.

It will, however, generally inform the applicant whether an improvement similar to his, and used for the same purpose, *has ever been patented in this country.*

Parties desiring the Preliminary Examination are requested to remit the fee, ($5,) and furnish us with a sketch or photograph, and a brief description of the invention.

Where examination is wanted upon more than one invention, $5 for each must be sent; as each device requires a separate, careful search. Address MUNN & Co., 37 Park Row, N. Y.

OTHER INFORMATION.

IF you wish for *general information* as to the rules and law of Infringements, Reissues, Claims, etc., state your inquiries clearly, and remit $5. Opinions in special cases of Infringement cost more. See page 16.

If you wish for advice in regard to assignments, or upon the rights of parties under assignments, joint ownership in patents, contracts, or licenses, state the points clearly upon which information is wanted, and remit $5.

If you desire to know in whose name the title to a Patent is officially recorded, at Washington; or if you wish for an abstract of all the deeds of transfer connected with a Patent, send us the name of the patentee, date of patent, etc., and remit $5.

If you desire a sketch from the drawings of any Patent, and a description from the specification, give the patentee's name, date of the patent, and remit $5.

If you desire to have an assignment of a Patent, or any share thereof, or a license, made out in the proper manner, and placed on record, give us the full names of the parties, residences, title of the invention, etc., and remit $5. This includes record fee.

Inventions or shares thereof may be assigned either before or after the grant of a patent. Agreements and contracts in regard to inventions need to be recorded, like assignments, at Washington. For any agreement or contract that you wish prepared, remit $5.

☞ Remember that we (MUNN & Co.) have branch-offices in Washington, and have constant access to all the public records. We can therefore make for you *any kind of search*, or look up for you *any sort of information* in regard to Patents, or Inventions, or Applications for Patents, either pending or rejected, that you may desire.

CAVEATS.

THE filing of a Caveat is oftentimes of great importance, as it may be quickly done, and affords a limited but *immediate protection.* The filing of a Caveat prevents, during its existence, the issue of a patent, without the knowledge of the Caveator, to any other person for a similar device. The Caveator is entitled to receive official notice, during a period of one year, of any other petition for a patent for a similar or interfering invention, filed during that time. On receiving such official notice, the Caveator is required to complete his own application within three months from the date of the notice.

A Caveat consists of a Specification, Drawing, Oath, and Petition. To be of any value, these papers should be carefully drawn up, and the official rules scrupulously complied with. No model is required. Our facilities enable us to prepare Caveat-papers with great dispatch.

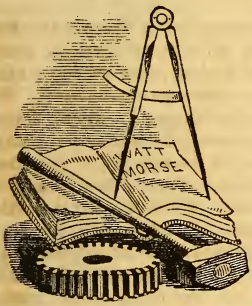
When specially desired, we can have them ready to send to the applicant, for signature and affidavit, by return mail, or at an hour's notice. The official fee for a Caveat is $10, and we generally charge $10 or $15 to prepare the accompanying papers and attend to the business—making $20 or $25 in all.

A Caveat runs for a year, and can be extended by paying $10 a year.

Caveats can only be filed by citizens of the United States, and aliens who have resided here one year and have declared their intention to become citizens.

To enable us to prepare Caveat papers, all that we need is a sketch, drawing, or photograph, and description of the invention, with which remit fees as above. Model not required.

PATENTS.



The Government fee, on filing an application for a patent, is $15. English, French, German, Prussian, Austrian, Spanish, and inventors of every nationality, may now obtain patents in the United States upon the same terms as our own citizens. Patents are also granted to women. The only discrimination made is against inhabitants of countries that discriminate against the inhabitants of the United States.

To the foregoing official fees must be added the attorney's fee for preparing the various documents and drawings.

Our charge for *preparing a case, presenting it to Government, and attending to all business connected with it, until a decision is given*, is generally $25; but the charge is higher if unusual labor is involved. Government stamps, $1.

Total ordinary expense to apply for a patent, $41; and this sum is lost if the patent is refused. If the patent is allowed, a second Government fee of $20 must be paid—making the whole expense $61.

In case of the death of an inventor, his heirs may obtain a patent.

Joint inventors are entitled to a joint patent.

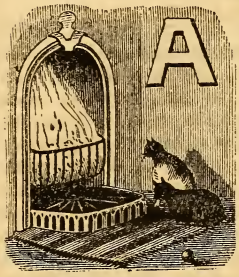
An agreement or partnership between two persons, one of whom is the inventor, cannot make them joint applicants for a patent.

The application for a patent must be made in the name of the inventor; but the patent may be issued to the assignee of the inventor.

Keep clear of law; for, even if you gain your case, you are generally a loser.

Let your expenses be such as to leave a balance in your pocket. Ready money is a friend in need.

REJECTIONS.



FTER an application for a pat
has been filed in Washington,
Commissioner of Patents in
tutes a rigid examination to
termine the patentability of
invention claimed. If the de
is not deemed patentable, the
plication is rejected. We
cause a *thorough investigatio*
be made, at Washington, into
reasons presented by the C
missioner for refusing the pa
In making this examination, we have access to all the d
ings, models, books, and specifications cited in refere
and we report the result as early as possible to our cl
For this service we make no charge.

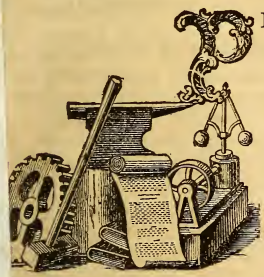
If the rejection proves to be an unjust one—which s
times happens—it can generally be reversed, and the
tent obtained by contesting the case. *For this prosec*
we charge a fee proportionate to the extra labor invc
payable on the issuing of the Patent, and arranged b
hand by special agreement. Models, in rejected case
retained by the Patent Office; except in cases wher
return of the model is asked for the purpose of alter
with a view to making a new application.

Inventors who have REJECTED CASES, prepared eith
themselves or for them by other agents, and desire to
tain their prospects of success by further efforts, are i
to avail themselves of our unequalled facilities in se
favorable results. We have been successful in se
Letters Patent in HUNDREDS of SUCH CASES. Our ter
such services are very moderate.

FORFEITED CASES.

By a recent change in the Patent Law, all inventors whose right to a patent has been forfeited by delay in the payment of the second Government fee, may now renew their rights by filing a new application. The original model may be used in presenting this new application.

MODELS, REMITTANCES, ETC.



PERSONS who apply for patents are by law required to furnish a model, in all cases where the invention can be illustrated or partly illustrated by a model. The model must not exceed twelve inches in any of its dimensions; it should be neatly made, of hard wood or metal, or other substantial material; the name of inventor should be engraved or painted upon it conuously. Where the invention consists of an improvet on some known machine, or part of a machine, a full king model of the whole will not be necessary. It ld be sufficiently perfect, however, to show, with clear, the nature and operation of the invention. More than patent cannot be taken out on one model.

hen the invention consists of a new article of manufacor a new composition, samples of the article must be shed.

w medicines or medical compounds, and useful mix of all kinds, are patentable. Samples must be furd, and a very minute statement must be made of the proportions and ingredients used.

soon as the model or specimen is ready, it should be ully boxed and shipped, by express or otherwise, to ddress, namely, MUNN & Co., No. 37 Park Row, New-City. Prepay the expense, and send the express t to us by mail.

Simultaneously with the model or specimens, the inventor should also send us the first instalment of the Government fee and stamps, $16. The money may be forwarded either by express, with the model, or by mail. The safest way to remit is by draft on New-York, payable to our order, or by Post-Office order. Always send a letter with the model, and also with the remittance, stating the name and

address of the sender. We sometimes receive envelopes containing money, but without any name or explanation; models are also frequently sent us from equally unknown sources.

A full written description should also be sent with the model, embodying *all the ideas of the inventor respecting the operation and merits of the improvement.* This statement is often of assistance to us in preparing the specification.

On the reception of the model and Government fee, the case is duly registered upon our books, and the application proceeded with as fast as possible. When the documents are ready, we send them to the inventor by mail, for his examination, signature and affidavit, with a letter of instruction, etc. *Our fee for preparing the case is then due*, and will be called for. Immediately on its return, the case will be presented to the Patent Office, and as soon as the patent is allowed, the applicant will be notified to remit the last instalment of the Government fee, namely, $20, and the patent will then be issued.

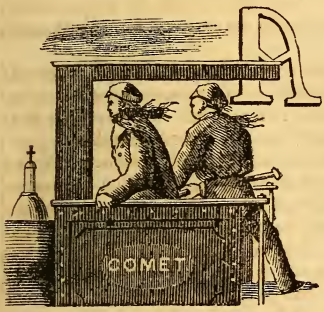
Inventors who do business with us will be notified of the state of their application in the Patent Office, when it is possible for us to do so. We do not require the personal attendance of the inventor, unless the invention is one of great complication; the business can be done as well by correspondence.

The average time required to procure a patent is six weeks. We frequently get them through in less time; but in other cases, owing to delay on the part of the officials, the period is sometimes extended to two or three months, and even more. We make a special point to forward our cases *as rapidly as possible.*

Be neither lavish nor niggardly; of the two, avoid the latter. A mean man is universally despised, but public favor is a stepping-stone to preferment; therefore, generous feelings should be cultivated.

Never, under any circumstances, assume a responsibility you can avoid consistently with your duty to yourself and others.

QUICK APPLICATIONS.



When, from any reason, parties are desirous of applying for Patents or Caveats *in great haste*, without a moment's loss of time, they have only to write or telegraph us specially to that effect, and we will make special exertions. We can prepare and mail the necessary papers at less than an hour's notice, if required.

THE INVENTOR MUST APPLY FOR THE PATENT.

It is necessary, in all cases, that an application for a patent should be made in the name of the inventor, and the petition and specification must be signed by him. An inventor may appoint an attorney, or may sell and assign all his interest in an invention; still the patent papers, on making the application, must be signed and sworn by the inventor; otherwise they will not be received by the Commissioner of Patents. Canadians, and other foreign inventors, have erroneously supposed that by transferring their full rights to an American citizen, preliminary to an application, they could thereby obtain the patent for the same small fee required of a citizen. But this is impossible; for the applicant is required to swear that he believes himself to be the first inventor.

Remember that self-interest is more likely to warp your judgment than all other circumstances combined; therefore, look well to your duty when your interest is concerned.

Wine-drinking, chewing, and smoking are bad habits; they impair the mind and pocket, and lead to a waste of time.

PATENTS FOR DESIGNS, ETC.

DESIGN-PATENTS may be taken out for *any new form of any article*, also for new tools, patterns, ornamental castings of machine-frames, stove-plates, borders, fringes; all new designs for printing, weaving, or stamping upon silks, calicoes, carpets, oil-cloth prints, paper-hangings, and other articles. New forms for trade-marks, labels, envelopes, boxes and bottles for goods, may also be patented; likewise all works of art, including prints, paintings, busts, statues, bas-reliefs, or compositions in alto, or basso-relievo, new dies, impressions, ornaments to be placed or used upon any article of manufacture, architectural work, etc. [See page 76, section 11.]

The term for which Design-Patents are granted varies according to the fee paid by the applicant, as follows:

Patent for three and one half years, $10; patent for seven years, $15; patent for fourteen years, $30.

No Models for Designs are required. But duplicate drawings must be furnished, together with the usual specification, petition, and affidavit, which, to render the patent of value, should be prepared with the utmost care. In many cases two good photographs of the Design which it is desired to patent may be used in lieu of drawings.

Address, MUNN & Co.,
37 Park Row, New-York City.

COPYRIGHTS.

PROTECTION may be obtained, under the Copyright Laws, for designs for Trade-Marks, Labels, Stamps, etc. The whole business of obtaining such copyrights is done by Munn & Co., 37 Park Row, for $5. Remit that sum, and send three copies of whatever you desire to have secured.

A copyright lasts for twenty-eight years, with privilege of renewal for fourteen additional years.

GOING TO WASHINGTON IN PERSON.

Some inventors suppose, very naturally, that if personally present in Washington, they can get their cases through more expeditiously, or command other important facilities. But this is not so. The journey to Washington is usually a mere waste of time and money. A good agent must be employed after the inventor gets there. *No inventor can possibly have facilities or influence superior to our own;* more than one third of the entire business of the Patent Office passes through our hands; and we have an office in Washington, charged with the especial duty of watching over and pressing forward the interests of our clients.

The Patent Office does not prepare patent papers, or make models. These must be provided by the applicant or his attorney, according to law, *otherwise his claim will not be considered.*

The law especially requires that all documents deposited in the Patent Office shall be correctly, legibly, and clearly written, and that the drawings shall be of a specified size, and executed in an artistic manner.

Persons who visit Washington in person, can have all their patent business *promptly attended to*, by calling at Munn & Co.'s Branch Scientific American Office, corner of 7th and F streets, opposite the Patent Office.

COPIES OF PATENTS, ASSIGNMENTS, ETC.

We furnish full copies of specifications or drawings of any existing patent, or open rejected case, official letter, assignment, etc., etc. The expense varies from $5 to $10 and over, according to the amount of work on the drawings. See page 7. For $1 we can send a copy of the *claims only*, of any existing patent.

INFRINGEMENTS.

THE general rule of law is, that the prior patentee is entitled to a broad interpretation of his claims. The scope of any patent is therefore governed by the inventions of prior date. To determine whether the use of a patent is an infringement of another, generally requires a most careful study of all analogous prior patents and rejected applications. An opinion based upon such study requires for its preparation much time and labor.

Having access to all the patents, models, public records, drawings, and other documents pertaining to the Patent Office, we are prepared to make examinations, and give opinions upon all infringement questions, advice as to the scope and ground covered by patents, and direct with vigor any legal proceedings therewith connected. Address, MUNN & Co., 37 Park Row, N. Y.

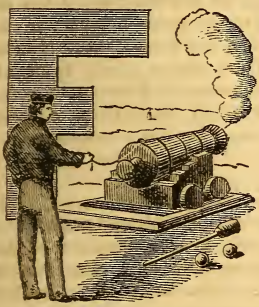
The expense of these examinations, with written opinion, varies from $25 to $100 or more, according to the labor involved. See page 7.

To the Editors of The Scientific American:

Let me encourage you, gentlemen, in your great enterprise. Perhaps we need light and elegant literature; we may even need "chess columns;" but let THE SCIENTIFIC AMERICAN continue to teach the people how to realize Dean Swift's prayer—"Make *two* blades of grass grow on the spot where only *one* grew before." Let it still increase the mechanical and agricultural knowledge of our artisans and farmers, by publishing the latest discoveries in science and improvements in the arts. And then its editors will have the noblest reward—that of being considered the guardian angels of genius, the champions of inventors, and the "prime motors" employed in developing the highest physical and intellectual resources of this great country.

Camden, Ark. W. A. SHAW, M.D.

GENERAL REMARKS.



OR over *twenty years* Messrs. Munn & Co. have been personally familiar with the progress of invention and discovery. As an evidence of the confidence reposed in them, they may with propriety refer to the extraordinary fact that nearly TWENTY THOUSAND PATENTS have been obtained by them; and through their efficient Branch Office in Washington they have examined into the novelty of *many thousand inventions*, thus affording to them a knowledge of the contents of the Patent Office unrivalled by any existing agency.

Not only this, but a large majority of all the patents secured by American citizens in European countries are taken through MUNN & CO.'S AGENCIES IN LONDON, PARIS, BRUSSELS, BERLIN, AND VIENNA.

In addition to the advantages which the long experience and great success of our firm in obtaining patents present to inventors, they are informed that all inventions patented through our establishment are noticed, *at the proper time*, in The Scientific American. This paper is read by more than one hundred thousand persons every week, and has the most extensive and influential circulation of all the journals of its kind in the world.

No individual in the country can possibly have so good an opportunity of knowing and judging as to the extent of business and the qualification of patent attorneys as the *Commissioner of Patents*. Judge Mason, upon retiring from the office of the Commissioner of Patents, sent us the following very flattering written testimonial:

COMMISSIONER MASON'S LETTER.

MESSRS. MUNN & Co.:

I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been FULLY DESERVED, as I have always observed, in all your intercourse with the office, a MARKED DEGREE of *promptness*, *skill*, and *fidelity* to the interests of your employers.

Yours, very truly, CHAS. MASON.

Judge MASON was succeeded by that eminent patriot and statesman, Hon. JOSEPH HOLT, whose administration of the Patent Office was so distinguished that he was appointed Postmaster-General of the U. S. Hon. Mr. HOLT was subsequently appointed Judge-Advocate-General. He addressed us the following very gratifying communication:

COMMISSIONER HOLT'S LETTER.

MESSRS. MUNN & Co.:

It affords me much pleasure to bear testimony to the *able and efficient manner* in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was VERY LARGE, and you sustained (and I doubt not justly deserved) the reputation of *energy*, MARKED ABILITY, and *uncompromising fidelity* in performing your professional engagements.

Very respectfully, your obedient servant, J. HOLT.

Hon. WM. D. BISHOP, late Member of Congress from Connecticut, succeeded Mr. HOLT as Commissioner of Patents. Upon resigning the office, he wrote to us as follows:

COMMISSIONER BISHOP'S LETTER.

MESSRS. MUNN & Co.:

It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very

large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as EMINENTLY QUALIFIED to perform the duties of Patent Attorneys with skill and accuracy.

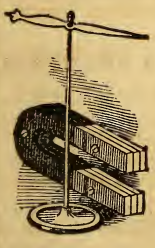
Very respectfully, your obedient servant,

WM. D. BISHOP.

One great reason for our unrivalled success is, that our affairs are so systematized and arranged under our personal direction, that every patent case submitted to our care receives the most careful study during its preparation, the most prompt dispatch, and the most thorough attention at every stage of its subsequent progress.

HOW TO CONVERT PAPER INTO GOLD.

SEND a subscription in paper money to Munn & Co., and enjoy a year's reading of THE SCIENTIFIC AMERICAN. Ten to one that the information thus obtained will result in bringing into your coffers, before the year is out, a hundred times more money in gold, than the original investment.



HE speed of an electric spark travelling over a copper wire, has been ascertained by Wheatstone to be two hundred and eighty-eight thousand miles in a second.

PARTIES sending models to the SCIENTIFIC AMERICAN office, on which they decide not to apply for Letters Patent, and which they wish preserved, will please to order them returned as early as possible. We cannot undertake to store such models, and if not called for within a reasonable time, we are obliged to destroy them, to make room for new arrivals.

EFFECTS OF HEAT UPON BODIES.

	Fahrenheit. Deg.		Fahrenheit Deg.
Cast-iron melts	2786	Cadmium	450
Gold "	2016	Tin melts	442
Copper "	1996	Tin and bismuth, equal parts, melts	283
Brass "	1900	Tin 3 parts, bismuth 5 parts, lead 2 parts, melt	212
Silver "	1873	Sodium	190
Red heat visible by day,	1077	Alcohol boils	174
Iron red hot in twilight,	884	Potassium	136
Common fire,	790	Ether "	98
Zinc melts	773	Human blood, (heat of,)	98
Iron, bright red in dark,	752	Strong wines freeze	20
Mercury boils	630	Brandy freezes	7
Lead melts	612	Mercury freezes	—39½
Linseed oil boils	600		
Bismuth melts	497		

SOUND

is the effect produced upon the ear when air is set in motion within certain limits of rapidity. Audible sound begins when about thirty-two vibrations per second are made, and ceases when about 8000 vibrations per second are reached.

The number of vibrations corresponding with the middle C of a musical instrument is 522 per second. An octave below, half the number; an octave above, twice the number.

Sound travels at the rate of 1100 feet per second in a still atmosphere. The distance in feet between an observer and the point where a stroke of lightening falls, may be known by multiplying 1100 by the number of seconds that elapse after the flash is seen until the sound is heard.

A MESSIEURS LES INVENTEURS FRANCAIS.

Les inventeurs français non familiers avec la langue anglaise et qui préféreraient nous communiquer leurs inventions en français, peuvent nous addresser dans leur langue natale. Envoyez nous un dessein et une description concise pour notre examen. Toutes communications seront reçues en confidence. Chaque personne, soit native ou etrangère, une seule exception, peut obtenir une patente dans les Etats Unis sous les mêmes conditions que les citoyens. On parle français dans nôtre bureau. MUNN & Co.,

37 Park Row, New-York, Scientific American Office.

OFFICIAL

RULES AND DIRECTIONS

FOR

PROCEEDINGS IN THE PATENT OFFICE.

[THE following embrace the principal official rules under which the business at the Patent Office is now conducted.]

What will prevent the granting of a Patent.

Although an applicant may have actually made an invention, a patent therefor will not be granted him if the whole or any part of what he claims as new has been patented, or described in any printed publication in this or any foreign country, or been invented or discovered in this country; nor if he has once abandoned his invention to the public, or for more than two years consented and allowed it to be in public use or on sale.

The mere fact of prior invention or discovery abroad will not prevent the issue of the patent, unless the invention has been there patented, or described in some printed publication.

Merely conceiving the idea of an improvement or machine in this country is not such an "invention" or "discovery" as is above contemplated. The invention must have been reduced to a practical form, either by the construction of the machine itself or of a model thereof, or at least by making a full drawing of it, or in some other manner equally descriptive of its exact character, so that a mechanic would be enabled, from the description given, to construct a model thereof, before it will prevent a subsequent inventor from obtaining a patent.

The Specification.

Two or more distinct inventions may not be claimed under one application for letters patent. No positive rules for guidance can be laid down on this point; but in general, where there are several parts or elements of a machine, art, process, manufacture, or composition of matter, having no necessary or dependent connection with each other, and each susceptible of separate and distinct use or application, either by itself or in other connections, all set forth and claimed under one application for letters patent, the office requires the party to divide the application and confine the claim to whichever invention he may elect.

Where a principle of operation or construction is invented or discovered, the party is allowed to claim the principle broadly, and one mode of carrying it into operation.

The specification must be signed by the inventor, (or by his executor or administrator, if the inventor be dead.) It should describe the sections of the drawings, (where there are drawings,) and refer by letters and figures to the different parts.

The oath may be taken (in this country) before any person authorized by law to administer oaths.

The oath may be taken in a foreign country before any minister plenipotentiary, *chargé d'affaires*, consul, or commercial agent, holding commission under the government of the United States, or before any notary public of the country in which the oath is taken, being attested in all cases by the proper official seal of such notary.

Drawings.

The applicant for a patent is required by law to furnish duplicate drawings, where the nature of the case admits of drawings, the office reference copy of which must be signed by the applicant, and attested by two witnesses. These should be sent with the specification. The drawings must be neatly and artistically executed in fast colors, on one or more sheets separate from the specification, the size of the sheets to be twenty inches from top to bottom, and fifteen across, this being the size of the patent. One of these

drawings, to be kept in the office for reference, must be on thick drawing-paper, sufficiently stiff to support itself upright in the portfolios. Tracings upon cloth, pasted upon thick paper, will not be admitted. The other drawing, which is to be attached to the patent, must have a margin of one inch at least for that purpose on the right-hand side, and should be on tracing-muslin, which will bear folding and transportation, and not on paper. The drawings should generally be in perspective, with such detached sectional and plane views as to clearly show what is the invention, its construction and operation. All thick drawings should be colored and shaded, and when different materials are united in a machine, as steel and iron, or wood and metal, the distinction should be indicated by different colors on the drawings. Each part must be distinguished by the same number or letter, whenever that part is delineated in the drawings.

Applicants are advised to employ competent artists to make the drawings, which will be returned if not executed in conformity with these rules. Thick drawings should never be folded for transmission.

Of the Examination.

All cases in the Patent Office are arranged in classes, which are taken up for examination in regular rotation; those in the same class being examined and disposed of, as far as practicable, in the order in which the respective applications are completed. When, however, the applicant has a foreign patent for his invention, or when such invention is deemed of peculiar importance to some branch of the public service, and when, for that reason, the head of some department of the government specially requests immediate action, the case will be taken up out of its order. These, with applications for reissues, are the only exceptions to the rule above stated in relation to the order of examination.

All amendments of the model, drawings, or specification must relate to the subject-matter originally embraced in at least one of them at the time of the filing of the application.

The personal attendance of the applicant at the Patent

Office is unnecessary. The business can be done by correspondence or by attorney.

When an application has been finally decided, the office will retain the original papers, furnishing the applicant copies—if he desires them—at the usual expense.

When a patent is granted, it will be transmitted to the patentee, or to his agent having a full power of attorney authorizing him to receive it.

Protests.

The Patent Office cannot stay the regular proceedings on applications for letters patent in consequence of protests founded upon *ex parte* statements, or upon affidavits from parties claiming to be aggrieved.

Retaining Patents in the Secret Archives.

An application upon which a patent has been allowed may, at the request of the applicant, or of his assignee, made before the patent has been recorded, be retained in the secret archives of the office for a period not exceeding six months from the date of the order to issue

Of Appeals.

After an application for a patent has been twice rejected by the examiner having it in charge, it may, at the option of the applicant, be brought before the board of examiners-in-chief.

For this purpose a petition in writing must be filed, signed by the party or his authorized agent or attorney, setting forth in general terms that the said applicant believes the rejection of his application to have been improper.

All cases which have been acted on by the board of examiners-in-chief may be brought before the Commissioner in person, upon a written request to that effect, and upon the payment of the fee required by law. A decision deliberately made and approved by one Commissioner will not be disturbed by his successor.

[The official fee for an appeal from the Examiners-in-Chief to the Commissioner in person, is $20. A further ap-

peal may be taken from the decision of the Commissioner to the U. S. Court of the District of Columbia. Official fee, $25. MUNN & Co. have had much successful experience in conducting these appeals. Charges moderate.]

The mode of appeal from the decision of the office to the Supreme Court of the District of Columbia is by giving written notice thereof to the Commissioner, filing in the Patent Office, within such time as the Commissioner shall appoint, reasons of appeal, and paying to him the sum of twenty-five dollars.

Of Interferences.

When each of two or more persons claims to be the first inventor of the same thing, an "interference" is declared between them, and a trial is had before the Commissioner. Nor does the fact that one of the parties has already obtained a patent prevent such an interference; for, although the Commissioner has no power to cancel a patent already issued, he may, if he finds that another person was the prior inventor, give him also a patent, and thus place them on an equal footing before the courts and the public.

When an application is found to conflict with a caveat, the caveator is allowed a period of three months within which to present an application, when an interference may be declared.

In cases of interference, patentees have the same remedies by appeal as applicants in pending applications.

In contested cases, whether of interference or of extension, parties may have access to the testimony on file, prior to the hearing, in presence of the officer in charge; or, when practicable, copies may be obtained by them at the usual charges.

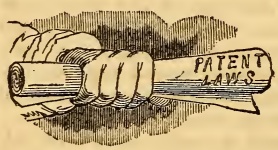
Upon the declaration of an interference, a day will be fixed for closing the testimony, and a further day fixed for the hearing of the cause. The arguments of counsel must be in the office on the day of hearing.

If either party wishes a postponement, either of the day for closing the testimony or of the day of hearing, he must, before the day he thus seeks to postpone is past, show by affidavit a sufficient reason for such postponement.

When an interference has been declared between two or more parties, and testimony has been taken by either of them, it will not be dissolved to admit a subsequent applicant; but when an interference is pending, and a new application claiming the invention in controversy comes into the Office before any ruling shall have been taken, the interference will be dissolved and a new one declared, which shall embrace all the claimants to the same invention.

[The management of Interferences is one of the most important duties in connection with Patent Office business. Our terms for attention to Interferences are moderate, and dependent upon the time required. Address all letters to MUNN & Co., No. 37 Park Row, New-York.]

Of Reïssues.



A reïssue is granted to the original patentee, his heirs, or the assignees of the entire interest, when by reason of an insufficient or defective specification the original patent is invalid, provided the error has arisen from inadvertence, accident, or mistake, without any fraudulent or deceptive intention.

An assignee or assignees making application for a reissue must own the entire interest in the patent, and must specify the date of the assignment.

The general rule is, that whatever is really embraced in the original invention, and so described or shown that it might have been embraced in the original patent, may be the subject of a reïssue.

Reïssued patents expire at the same time that the original patent would have done. For this reason, applications for reïssue will be acted upon immediately after they are completed.

A patentee may, at his option, have in his reïssue a separate patent for each distinct part of the invention comprehended in his original application, by paying the required fee in each case, and complying with the other requirements of the law, as in original applications.

Each division of a reïssue constitutes the subject of a separate specification descriptive of the part or parts of the invention claimed in such division; and the drawing may represent only such part or parts.

One or more divisions of a reïssue may be granted, though other divisions shall have been postponed or rejected.

In all cases of applications for reïssues, the original claim is subject to reëxamination, and may be revised and restricted in the same manner as in original applications.

But in all such cases, after the action of the Patent Office has been made known to the applicant, if he prefers the patent originally granted to that which will be allowed by the decision of the Office, he has the privilege of abandoning the latter and retaining the old patent.

[The documents required for a Reïssue are a Statement, Petition, Oath, Specification, Drawings. The official fee is $30. Our charge, in simple cases, is $25 for preparing and attending to the case. Total ordinary expense, $55. Reissues may be applied for by the owners of the patent.

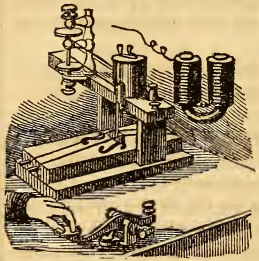
By means of Reïssue, a patent may sometimes be divided into several separate patents. Many of the most valuable patents have been several times reïssued and subdivided. Where a patent is infringed and the claims are doubtful or defective, it is common to apply for a Reïssue with new claims which shall specially meet the infringers.

On making application for Reïssue, the old or original patent must be surrendered to the Patent Office, in order that a new patent may be issued in its place. If the original patent has been lost, a certified copy of the patent must be furnished, with affidavit as to the loss. To enable us to prepare a Reïssue, the applicant should send to us the original patent, remit as stated, and give a clear statement of the points which he wishes to have corrected. We can then immediately proceed with the case. Address MUNN & Co., 37 Park Row, New-York. We have had great experience in obtaining Reïssues.]

Of Disclaimers.

Where, by inadvertence, accident, or mistake, the original patent is too broad, a disclaimer may be filed either by the original patentee or by any of his assignees.

Of Extensions.



The applicant for an extension must file his petition and pay in the requisite fee at least ninety days prior to the expiration of his patent. There is no power in the Patent Office to renew a patent after it has once expired.

The questions which arise on each application for an extension are:

1. Is the invention *novel?*
2. Is it *useful?*
3. Is it *valuable* and *important* to the public?
4. Has the inventor been *adequately remunerated* for his time and expense in originating and perfecting it?
5. Has he used due diligence in introducing his invention into general use?

The first two questions will be determined upon the result of an examination in the Patent Office; as will also the third, to some extent.

To enable the Commissioner to come to a correct conclusion in regard to the third point of inquiry, the applicant should, if possible, procure the testimony of persons disinterested in the invention, which testimony should be taken under oath.

In regard to the fourth and fifth points of inquiry, in addition to his own oath showing his receipts and expenditures on account of the invention, by which its value is to be ascertained, the applicant should show, by the testimony of witnesses on oath, that he has taken all reasonable measures to introduce his invention into general use; and that, without default or neglect on his part, he has failed to obtain from the use and sale of the invention a reasonable remuneration for the time, ingenuity, and expense bestowed on the same, and the introduction thereof into use.

In case of opposition by any person to the extension of a patent, both parties may take testimony, each giving rea-

sonable notice to the other of the time and place of taking said testimony, which shall be taken according to the rules prescribed by the Commissioner of Patents in cases of interference.

All arguments submitted must be in writing.

[NOTE.—Only patents issued prior to March 4, 1861, can be extended.

Many valuable patents are annually expiring which might readily be extended, and, if extended, might prove the source of wealth to their fortunate possessors.

All the documents connected with extensions require to be carefully drawn up and attended to, as any failure, discrepancy, or untruth in the proceedings or papers is liable to defeat the application.

In case of the decease of the inventor, his administrator may apply for and receive the extension; but no extension can be applied for or granted to an assignee of an inventor. Parties desiring extensions will address MUNN & Co., 37 Park Row, N. Y.]

Of Foreign Patents.

The taking out of a patent in a foreign country does not prejudice a patent previously obtained here; nor does it prevent obtaining a patent here subsequently.

When the patent is granted here, after being obtained abroad, it will extend only seventeen years from the date of the foreign patent.

Of Assignments and Grants.

The assignee of any invention may have the patent issue to him directly; but this is held to apply only to assignees of entire interests.

Although when the inventor assigns his *entire* interest to two or more, a patent will issue to them jointly, still, if he yet retain a portion in himself, a joint patent will not be issued to him and them; the inventor, however, may make himself an assignee of a part interest of his invention.

An inventor can assign his entire right before a patent is obtained, so as to enable the assignee to take out a patent in his own name; but the assignment must first be recorded and the specification sworn to by the inventor.

After a patent is obtained, the patentee may grant the right to make or use the thing patented in any specified portion of the United States.

Every assignment or grant should be recorded within three months from its date; but if recorded after that time, it will protect the assignee or grantee against any one purchasing after the assignment or grant is placed on record.

When the patent is to issue in the name of the assignee, the entire correspondence should be in his name.

The receipt of assignments is not generally acknowledged by the office. They will be recorded in their turn within a few days after their reception, and then transmitted to persons entitled to them. A five-cent stamp, cancelled, is required on every assignment, and on every oath and every certificate attached thereto.

Form of Assignment of the entire Interest in Letters Patent before obtaining the same, and to be recorded preparatory thereto.

Whereas I, Jethro Wood, of Scipio, in the county of Cayuga, and State of New-York, have invented certain new and useful improvements in ploughs, for which I am about to make application for letters patent of the United States; and whereas David Peacock, of Burlington, New-Jersey, has agreed to purchase from me all the right, title, and interest which I have, or may have, in and to the said invention, in consequence of the grant of letters patent therefor, and has paid to me, the said Wood, the sum of five thousand dollars, the receipt of which is hereby acknowledged: Now this indenture witnesseth, that, for and in consideration of the said sum to me paid, I have assigned and transferred, and do hereby assign and transfer, to the said David Peacock, the full and exclusive right to all the improvements made by me, as fully set forth and described in the specification which I have prepared and executed preparatory to the obtaining of letters patent therefor. And I do hereby authorize and request the Commissioner of Patents to issue the said letters patent to the said David Peacock, as the assignee of my whole right and title thereto, for the

sole use and behoof of the said David Peacock and his legal representatives.

In testimony whereof, I have hereunto set my hand and affixed my seal this 16th day of February, 1856.

JETHRO WOOD. [SEAL.]

Sealed and delivered in presence of—
GEORGE CLYMER,
DAVID RITTENHOUSE.

Form of a Grant of a Partial Right in a Patent.

Whereas I, Jethro Wood, of Scipio, in the county of Cayuga, and State of New-York, did obtain letters patent of the United States for certain improvements in ploughs, which letters patent bear date the 1st day of March, 1855; and whereas David Peacock, of Burlington, New-Jersey, is desirous of acquiring an interest therein: Now this indenture witnesseth, that for and in consideration of the sum of two thousand dollars, to me in hand paid, the receipt of which is hereby acknowledged, I have granted, sold, and set over, and do hereby grant, sell, and set over, unto the said David Peacock, all the right, title, and interest which I have in the said invention, as secured to me by said letters patent, for, to, and in the several States of New-York, New-Jersey, and Pennsylvania, and in no other place or places; the same to be held and enjoyed by the said David Peacock, for his own use and behoof, and for the use and behoof of his legal representatives, to the full end of the term for which said letters patent are granted, (if it is intended to grant for any extended term, then add—and for the term of any extension thereof,) as fully and entirely as the same would have been held and enjoyed by me had this grant and sale not been made.

In testimony whereof, I hereunto set my hand and affix my seal this sixteenth day of February, 1856.

JETHRO WOOD. [SEAL.]

Sealed and delivered in presence of—
JACOB PERKINS,
BENJAMIN FRANKLIN.

[Records of the title or ownership in patents are kept at Washington. Persons who wish to have searches made should address MUNN & Co., 37 Park Row. See "Other Information," page 7.]

Stamps.

Revenue stamps must be attached as follows:

A stamp of the value of *fifty cents* is required upon each power of attorney authorizing an attorney or agent to transact business with this office relative to an application for a patent.

No assignment directing a patent to issue to an assignee or assignees will be recognized by the Patent Office unless every sheet or piece of paper upon which such an assignment shall be written shall have affixed thereto a stamp of the value of *five cents.*

A stamp of the value of five cents is required upon each certificate of a magistrate.

Rules of Correspondence.

All correspondence must be in the name of the Commissioner of Patents; and all letters and other communications intended for the office must be addressed to him. If addressed to any of the other officers, they will not be noticed, unless it should be seen that the mistake was owing to inadvertence. A separate letter should in every case be written in relation to each distinct subject of inquiry or application, the subject of the invention and the date of filing being always carefully noted.

When an agent has filed his power of attorney, duly executed, the correspondence will, in ordinary cases, be held with him only. A double correspondence with him and his principal, if generally allowed, would largely enhance the labor of the office. For the same reason, the assignee of the entire interest in an invention is alone entitled to hold correspondence with the Office, to the exclusion of the inventor. If the principal becomes dissatisfied, he must revoke his power of attorney, and notify the Office, which will then communicate with him.

Of the Filing and Preservation of Papers.

All claims and specifications filed in the office (including amendments) must be written in a fair, legible hand, without interlineations or erasures, except such as are clearly stated in a marginal or foot-note written on the same sheet of paper; or, failing in which, the office may require them to be printed.

All papers filed in the office will be regarded as permanent records of the office, and must never, on any account, be changed, further than to correct mere clerical mistakes.

Of giving or withholding Information.

Aside from the caveats, which are required by law to be kept secret, all pending applications are, as far as practicable, preserved in like secrecy. No information will therefore be given those inquiring whether any particular case is before the office, or whether any particular person has applied for a patent.

But if a party whose application has been rejected allows the matter to rest for two years without taking any further steps therein, he will be regarded as having abandoned his application, so far at least that it will no longer be protected by any rule of secrecy. The specification, drawings, and model will then be subject to inspection in the same manner as those of patented or withdrawn applications.

Information in relation to pending cases is given so far as it becomes necessary in conducting the business of the Office, but no further. Thus, when an interference is declared between two pending applications, each of the contestants is entitled to a knowledge of so much of his antagonist's case as to enable him to conduct his own understandingly.

Where the rejection of an application is founded upon another case previously rejected, but not withdrawn or abandoned, the rejected applicant will be furnished with all information in relation to the previously rejected case which is necessary for the proper understanding and management of his own.

When an applicant claims a certain device, and the same device is found *described* but not *claimed* in another pending application which was previously filed, information of the

filing of such second application is always given to the prior applicant, with a suggestion that if he desires to claim a patent for that device, he should forthwith modify his specification accordingly.

But where the application, which thus describes a device without claiming it, is subsequent in date to that wherein such device is claimed, the general rule is, that no notice of the claim in the previous application is given to the subsequent applicant. But where there are any special reasons to doubt whether the prior applicant is really the inventor of the device claimed, or where there are any other peculiar and sufficient reasons for departing from the rule above stated, the Office reserves to itself the right of so doing without its being regarded as a departure from the established rule.

The Office cannot respond to inquiries as to the novelty of an alleged invention, in advance of an application for a patent, nor to inquiries founded upon brief and imperfect descriptions propounded with a view of ascertaining whether such alleged improvements have been patented, and if so, to whom; nor can it act as an expounder of the patent law, nor as counsellor for individuals.

☞ The reader will bear in mind that the foregoing are the official rules for doing business at the Patent Office.

Inquiries as to the novelty of inventions may be addressed to Munn & Co., 37 Park Row, N. Y. See pages 5 and 6.

Base all your actions upon a principle of right; preserve your integrity of character, and in doing this never reckon on the cost.

The world estimates men by their success in life, and, by general consent, success is evidence of superiority.

Arsenic volatilizes before it fuses, and antimony melts a little below redness. Professor Draper thinks he has shown that all substances become red at the same point—1006 degrees Fahrenheit.

MODELS.

It is always better for inventors to have their models constructed under their own supervision, even at an increased cost in money or time. During the making of the model, the inventor often perceives points where important changes can be made, or where the invention may be rendered more perfect than was at first contemplated. But in some instances, owing to residence in distant parts or other causes, it is impossible for the inventor to furnish a model. In such cases, we (MUNN & Co.) can have proper models built by experienced and trusty makers, at moderate charges.

TRACING PAPER.

OPEN a quire of double crown tissue-paper, and brush the first sheet with a mixture of mastic varnish and oil of turpentine, equal parts; proceed with each sheet similarly, and dry them on lines by hanging them up singly. As the process goes on, the under sheets absorb a portion of the varnish, and require less than if single sheets were brushed separately. The inventor of this varnish for tracing-paper received a medal and premium from the Royal Society. It leaves the paper quite light and transparent, it may readily be written on, and drawings traced with a pen are permanently visible. Used by learners to draw out lines. The paper is placed on the drawing, which is clearly seen, and an outline is made, taking care to hold the tracing-paper steady. In this way, elaborate drawings are easily copied.

ALCOHOL has more than double the expansive force of water of the same temperature. The steam of alcohol at 174° is equal to that of water at 212°. When proper means can be invented for saving the fluid from being lost, it is supposed that alcohol can be employed with advantage as the moving power for engines.

VOICE OF THE PEOPLE.

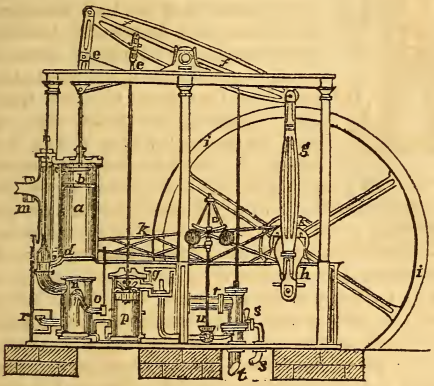
We might fill several volumes with flattering testimonials from all parts of the world, certifying to the great value of The Scientific American, but the limits of this little book only permit us to make a few selections. Read the following:

Messrs. Editors: Since I had the pleasure of receiving the back numbers of your interesting and instructive journal, I have shown specimens to several influential manufacturers and intelligent mechanics in this vicinity. One man told me that he had *twice* obtained five dollars for *a single recipe* that he copied out of The Scientific American, which he has taken regularly for several years; and I presume this is not an isolated case, by many hundreds. It is just such journals as yours that are annually condensed into encyclopedias, the compilers of which roughly scoop off the cream of all the new discoveries in science and art that have been recorded in the columns of various periodicals during the year; but the facts set forth in such annual works are often so mutilated or distorted in the condensation, and so meagre in outline, as to be practically of no value. Every mechanic and farmer in the land should subscribe for The Scientific American, not only for his own benefit, but also that of his children; he may have a Franklin or a Fulton, a West or a Watt, in that little marble-player whom he pets in his leisure hours; and the natural bias of the child's mind toward mechanical or agricultural pursuits requires to be confirmed or further developed by intellectual nourishment of such a quality and quantity as can be derived only from a journal like your own.

Never make money at the expense of your reputation.
Say but little—think much and do more.
Avoid borrowing and lending.

THE STEAM-ENGINE.

Every mechanic and inventor should make himself generally familiar with the construction and operation of the steam-engine. To assist them in gaining this knowledge, we subjoin for reference a diagram of the common Condensing Engine, with letters of reference to the names of the various parts:



a, steam cylinder; *b*, piston; *c*, upper steam port or passage; *d*, lower steam port; *e e*, parallel motion; *f f*, beam; *g*, connecting rod; *h*, crank; *i i*, fly-wheel; *k k*, eccentric and its rod for working the steam-valve; *l*, steam-valve and casing; *m*, throttle-valve; *n*, condenser; *o*, injection-cock; *p*, air-pump; *q*, hot well; *r*, shifting-valve to create vacuum in condenser previous to starting the engine; *s*, feed-pump to supply boilers; *t*, cold-water pump to supply condenser; *u*, governor. A study of the above diagram and description, in connection with attentive observation of engines in motion, will be of much assistance in acquiring a general understanding of the machine. We recommend the follow-

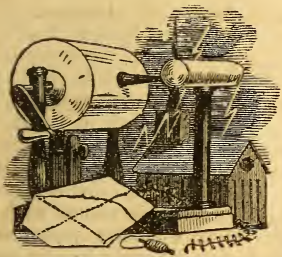
ing standard works for careful study by all who desire to become thoroughly posted: Bourne's Catechism of the Steam-Engine, Main & Brown's Marine Steam-Engine.

[From The Scientific American.]

A HINT TO LETTER-WRITING BORES.

WE consider, as a general thing, that our correspondents are a fair and high-minded set of men, such as we are most happy to accommodate by answering, so far as it is in our power, all their inquiries; but there are a few of whom we can very justly complain. They put to us all sorts of questions, to answer which might require a half-day of our valuable time; and if we snub them off with a short answer, they are likely to reply back in complaining terms. It cannot be reasonably expected of us, that we shall spend our time in such—to us—profitless letter-writing. We mean to be accommodating, but cannot consent to waste all our time in getting information for correspondents who seem not to know how to appreciate either our forbearance or the value of our time. As an example of what we mean, we have a case before us. A correspondent wants us to hunt through our files for a notice of some book which appeared in The Scientific American some years ago, and to help him to find the book. He also wants us to find for him an English book which we do not believe can be had in this market. Another correspondent wants us to send to England without delay to get something which would require time and money to procure for him, but in regard to which he don't even inclose a three-cent stamp to pre-pay our letter. Another incloses three cents, and wants a calculation made which would cost us two hours' hard study. It is well enough for such correspondents to know that our time is worth to us more than a cent and a half per hour. Treat us fairly, and you will have no cause of complaint.

VOICE OF THE PRESS.



In examining the pages of our journal, we find them so covered with brilliant gems of commendation that it is difficult to select one which is more sparkling than another. We therefore take the following at random:

"The distinction achieved by the world-renowned firm of Munn & Co., as Solicitors of Patents, is alike *deserved* and commanding—deserved, because they have spared no effort nor expense since they entered upon their responsible vocation—commanding, because it is a distinction supported and upheld by all the scientific appliances within the reach of modern enterprise, and carries along with it a *prestige* which we in vain look for in the history of any similar firm. To the scores of inventors who are to be met with in this State—and especially to those among them whose diffidence may have hitherto restrained them from giving their discoveries to the world—we would say, by all means consult the firm of Messrs. Munn & Co., 37 Park Row, New-York, confident, as we feel, that by so doing (should your inventions possess merit) you will not only put yourself in the way of securing a patent for the same, but at the same time reap the satisfaction of knowing that you have committed your claims to hands emphatically qualified successfully to carry them out. We have deemed it a *duty*, in this mode, to 'say our say' in regard to an Agency which, while, we trust, it has been able to make its highly important business *pay*, has, at the same time, nobly upheld the true principles of scientific investigation, scorning to make the latter in the least degree subservient to merely pecuniary considerations."—*Rahway (N. J.) Times and Register.*

A cubic foot of air weighs 523 grains—a little more than an ounce. A cubic foot of water weighs 1000 ounces.

FOREIGN PATENTS.

American Inventors should bear in mind that, as a general rule, any invention which is valuable to the patentee in this country, is worth equally as much in England and some other foreign countries. Four patents—American, English, French, and Belgian—will secure an inventor exclusive monopoly to his discovery among *one hundred millions* of the most intelligent people in the world. The facilities of business and steam communication are such, that patents can be obtained abroad by our citizens almost as easily as at home.

Models are not required in any European country, but the utmost care and experience is necessary in the preparation of the specifications and drawings. A variety of small tax duties and other fees must be paid; many official formalities are also to be observed in obtaining foreign patents. It is therefore important that the applicant should place his business in the hands of established and reliable agents.

For the past twenty years, the majority of all patents taken out by Americans in foreign countries have been obtained through Munn & Co.'s Scientific American Patent Agency, and nearly all of this foreign patent business is still done by us. Our experience and success in this branch is very great.

The following summary will give a general idea of the expenses and duration of European Patents:

Great Britain.—Patents are granted for fourteen years to any person who is the inventor or the first importer. If a patent has been previously obtained in any other country, the British patent expires with it. The British patent extends over Great Britain and Ireland, but does not include

the Colonies. Separate patents are issued by the Colonies. The cost of a British patent is generally about $350, of which $100, for Provisional Protection, are payable at the time of making application, and the remainder in four months. Three years from the date of the patent a further sum of £50 must be paid, and a final sum of £100 at the end of seven years.

British Patents for designs, having reference to articles of utility, intended to protect the shape or configuration of the article, are granted for three years; expense, $100.

France.—Term of the patent, fifteen years. Annual fees, $20. Total expenses of obtaining, about $150.

Belgium.—Term of the patent, twenty years. Small annual fees. Expense of obtaining, about $150.

EXPENSE OF FOREIGN PATENTS — INCLUSIVE OF ALL FEES.

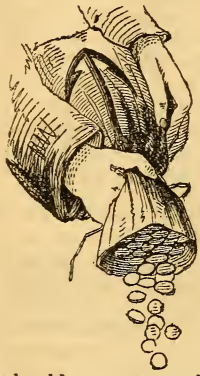
Austria,	$250	Italy,	$200
Australia,	250	Kingdom Two Sicilies,	200
Bavaria,	150	Netherlands,	150
Belgium,	150	Poland,	150
Cuba,	250	Portugal,	150
Dutch West-Indies,	250	Prussia,	200
France,	150	Russia,	500
Great Britain,	350	Saxony,	100
Holland,	150	Spain,	400
India,	400	Sweden,	300

Parties intending to secure patents abroad will please address MUNN & Co., 37 Park Row, New-York, and obtain their *pamphlet* (free) relating exclusively to Foreign Patents.

CAUTION.—Pay no attention to the solicitation of foreign agents of unknown responsibility, who send circulars to parties whose names they copy from the patent lists of THE SCIENTIFIC AMERICAN.

CLEAR, dry, cold air contains more oxygen, is more bracing to the human system, and is heavier than moist air. People are accustomed to say that the air on damp days feels heavy; but the truth is, the air is lighter, and therefore the blood is less oxydized, and the feelings consequently depressed.

HOW TO SELL PATENTS.



In the prefatory portion of this little work, we have presented hints upon the general success of inventors, and the great value of even the simplest inventions. But it must not be supposed, because a patent is granted, that the world will run after an unknown man to buy from him an unknown patent. In order to sell a patent, judicious effort is required on the part of the inventor or his agent. Indeed, his final success will depend, to a considerable extent, upon his business tact and energy. He should make himself thoroughly conversant with the merits of his invention, and should prepare specimens or model machines thereof, made in the most perfect manner, so as readily to exhibit the operations of the improvement to others.

After obtaining a patent, the first grand requisite in effecting its sale is to make the merits and importance of the improvement *publicly known*. This may be done in various ways: by advertisements in newspapers, by cards, circulars, pamphlets, etc., by local and travelling agents. Some persons appoint agents in each town or county, giving them a liberal portion of the net proceeds for the sale of rights, or a handsome per cent upon the receipts for machines sold. In estimating the value of patent rights for different States, counties, etc., one very common method is to fix the price with reference to the amount of population.

One of the most comprehensive and powerful methods of bringing the merits of an invention before the public, is to have it noticed and engraved in The Scientific American. This paper, published weekly, has a large circulation. It is seen by probably not less than one or two hundred thousand readers, who comprise all of the most intelligent persons of scientific and mechanical acquirements in the country. The fact of publication in The Scientific Amer-

ICAN is a passport to their attention and favor. It is upon the judgment and advice of scientific and mechanical persons that the purchasers of patent rights and new inventions are apt to rely. "Yes, that is a good invention. It has been well illustrated in THE SCIENTIFIC AMERICAN, and I fully understand its construction. I advise you to purchase the right." We suppose that more patents are sold upon such advice than by all other agencies and means put together.

To assist the sale, it is always advisable to have the patent taken out through the SCIENTIFIC AMERICAN AGENCY. The study necessary to the preparation of the specification and drawings familiarizes our minds with the merits of the invention, and as all worthy inventions patented by us are noticed in THE SCIENTIFIC AMERICAN, we are enabled to speak of them with some degree of authority.

We keep artists constantly employed in preparing engravings for THE SCIENTIFIC AMERICAN. All our engravings are original. We never print old cuts. Parties who desire to have engravings inserted in THE SCIENTIFIC AMERICAN will please address MUNN & Co., 37 Park Row, New-York. After publication, the engravings will be returned to the owner, who can then use them for other papers, circulars, etc.

AGENTS TO SELL.

WE are often asked to give the names of parties who make it a business to sell patents. We are rarely enabled to do so. Such concerns are generally quite fugitive in their character. An office is opened, signs displayed, a few customers engaged, and then suddenly the shop is closed. The truth is, that the profit upon the sales of a single good patent is equivalent to a fortune, and the business it furnishes is enough to fully engage the attention of many persons. Our advice to patentees is: Take hold of the business of selling yourselves. If you want assistance, search for agents among your friends, and interest them specially in your invention.

ROYALTY.

One very profitable source of income from patents is *royalty*. This, in effect, involves a sort of contract between a patentee and a manufacturer, by which the latter, in consideration of license to make the thing, agrees to pay to the patentee a specified sum upon each article when sold. The patentee of the chimney-spring, now so commonly used to fasten chimneys upon lamps, was accustomed to grant licenses to manufacturers on receiving a royalty of a few cents per dozen. His income was at one time reported to be fifty thousand dollars a year from this source. Howe, the inventor of the sewing-machine, is said to receive a royalty of from five to ten dollars on each machine, and his annual income has been estimated at five hundred thousand dollars. We might give many examples of success. The license and royalty plan is oftentimes the most profitable method of employing patents.

A Circle is the most capacious of all plain figures, or contains the greatest area within the same outline or perimeter.

To find the circumference of a circle, multiply the diameter by 3.1416, and the product will be the circumference.

To find the diameter of a circle, divide the circumference by 3.1416, and the quotient will be the diameter.

Any circle whose diameter is double that of another, contains four times the area of the other.

Some employers think themselves entitled to the ownership of all inventions made by their workmen. But this is not so. Employers have no claim to the inventions of their workmen unless it can be shown that the latter was specially employed to bring out such inventions.

[From The Scientific American.]

PATENTS ON SMALL THINGS.

An English firm has lately patented a peculiar shape for candle-ends. By making them conical, or tapering, they will fit any candlestick without being papered or tinkered up in other ways. Now, a very small royalty on each pound of candles will give a large annual revenue to the inventors, and the pecuniary value of their idea is seen at once. Similar instances might be given from cases at home, where inventors have originated some simple article in daily use and secured it, they have received large rewards. "Despise not the day of small things," says the proverb, and we may say, in addition, deride no idea as useless that tends to advance the arts and sciences, merely because it seems simple.

A very great misconception prevails in the minds of many persons in respect to patents. They are regarded chiefly as stepping-stones to fame or passports to future notoriety. This is a huge delusion. An invention is first and principally an investment, just as an artist's picture, although an inspiration, is a commercial venture. The glory and renown attaching to either picture or invention is the afterpart, the dessert to the solid feast on dollars and cents. The natural result of the mistake alluded to is to lead persons to underrate the value of their ideas. It is not at all uncommon to hear individuals exclaim, "What! get a patent on that thing!" in alluding to some little affair that can be carried in the pocket. That very despised "thing" will doubtless be the foundation of a good fortune, as many a similar article has been before it.

The improvement in some art or manufacture suggests itself to an individual, and he straightway applies it to his own use with very great advantage. Now, what shall he do? Patent it and secure the fruit of his genius to him-

self, or give it to the world without price? The business man would say the former; because if notoriety be the object, great patents confer not only means, but distinction, and where the first is attained, the second follows.

[From The Scientific American.]

A SPARKLING VANE.

A very curious and elegant vane for buildings may be made by placing in the centre a spiral or twisted spindle, as shown in the above cut. This spindle should be hung on delicate pivots, and the spaces between the spiral flanches nearly covered with small pieces of looking-glass or thin pieces of mica. The least breeze will put it in motion, and as the reflectors will assume every possible position, several of them will be sure to present the reflection of the sun at every revolution, from whatever point it may be viewed, thus producing a constant and very brilliant sparkling.

ELECTRICAL CONDUCTING POWER OF METALS.

The effect of the electrical discharge on metallic bodies is to raise their temperature to a less or greater degree, according to their conducting power. The best conductors are silver and copper; the poorest, lead; as will be seen from the subjoined table:

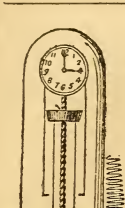
	Heat evolved.	Conducting Power.
Silver,	6	120
Copper,	6	120
Gold,	9	80
Zinc,	18	40
Platinum,	30	24
Iron,	30	24
Tin,	36	20
Lead,	72	12

[From The Scientific American.]

IMPORTANT TO INVENTORS.

THE United States Patent Office at Washington contains nearly 50,000 models pertaining to patented inventions, all of which are open to public inspection and examination, together with the drawings and specifications relating thereto. But the distance of the Capital and the time and expense involved in a journey thither deter, in fact, the majority of inventors from reaping the advantages which a personal examination of previously patented inventions might oftentimes give them. To obviate this difficulty we (Munn & Co.) are in the habit of making these examinations at the Patent Office for inventors. When it is desired to ascertain definitely whether an invention, believed to be new, has been previously made, or to what extent, if any, it has been anticipated, the applicant sends to us a rough sketch and description of the device. We then make a thorough examination in the Patent Office at Washington, and report the result to the applicant. The charge for this service is only $5, and it is frequently the means of saving the applicant the entire expense of preparing a model, paying Government fees, etc., by revealing the fact that the whole or material portion of his improvement was previously known. This preliminary examination is sometimes also of importance in assisting to properly prepare the papers, so as to avoid conflicting with other inventions in the same class. The reader should carefully note the distinction made between this preliminary examination at the Patent Office and the examination and opinion given at our office, either orally or by letter, for which no fee is expected. It is only when a special search is made at the Patent Office that the fee of $5 is required. We are able, in a vast number of cases submitted to us, to decide the question of patentability without this special search. See page 6 of this little work.

WHEN the air is exhausted from a pump-tube, (usually done by means of a piston,) the pressure of the atmosphere will cause the water to rise in the tube to a height of thirty feet.



"THE SCIENTIFIC AMERICAN.—We are sure that if a few words of seasonable commendation should induce any of that large class of intelligent readers who can appreciate true merit, to subscribe for this excellent publication, we shall be abundantly rewarded in the conviction of having earned their gratitude. It is only recently that we have looked into its columns with any degree of regularity, and we take an early opportunity to express the extreme satisfaction and interest which we have experienced in doing so. To condense our idea of its most valuable characteristic into one sentence, we consider THE SCIENTIFIC AMERICAN as embodying the highest function of all science, namely, its application to the practical, every-day concerns of life, in clear, pure, agreeable language. It will prove a pleasant guest and a useful companion at any fireside it may enter."—*Watchman, Greenport, L. I.*

THE SCIENTIFIC AMERICAN ought to be taken, read, and studied by every intelligent man, young or old, worker or idler, rich or poor, in the country. It commends itself to every one, and is useful and interesting to all. The most scientific may learn from it, and the unscientific understand it. It has a peculiar charm about it that interests and affects every person with a grain of sense in his head. We are in the habit of sending our copy, after a thorough perusal, to the army, and the friend who receives it writes us, that he likes it better than any other paper; that it is longingly waited for, and eagerly read by his comrades, and never ceases its circulation until so bethumbed that its columns are no longer readable.—*Westchester County Journal.*

Remember that, by subscribing to THE SCIENTIFIC AMERICAN, you receive, in the course of the year, an amount of reading matter nearly equal to *four thousand ordinary book pages.*

THE light of lightning and its reflections, will penetrate from 150 to 200 miles.

HORSE-POWER.

When Watt began to introduce his steam-engines he wished to be able to state their power as compared with that of horses, which were then generally employed for driving mills. He accordingly made a series of experiments, which led him to the conclusion that the average power of a horse was sufficient to raise about 33,000 lbs. one foot in vertical height per minute, and this has been adopted in England and this country as the general measure of power.

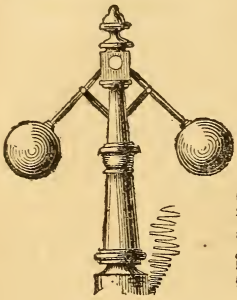
A waterfall has one horse-power for every 33,000 lbs. of water flowing in the stream per minute, for each foot of fall. To compute the power of a stream, therefore, multiply the area of its cross section in feet by the velocity in feet per minute, and we have the number of cubic feet flowing along the stream per minute. Multiply this by $62\frac{1}{2}$, the number of pounds in a cubic foot of water, and this by the vertical fall in feet, and we have the foot-pounds per minute of the fall; dividing by 33,000 gives us the horse-power.

For example: A stream flows through a flume 10 feet wide, and the depth of the water is 4 feet; the area of the cross section will be 40 feet. The velocity is 150 feet per minute—$40 \times 150 = 6000$ = the cubic feet of water flowing per minute. $6000 \times 62\frac{1}{2} = 375{,}000$ = the pounds of water flowing per minute. The fall is 10 feet; $10 \times 375{,}000 = 3{,}750{,}000$ = the foot-pounds of the water-fall. Divide 3,750,000 by 33,000, and we have $113\frac{3}{11}$ as the horse-power of the fall.

The power of a steam-engine is calculated by multiplying together the area of the piston in inches, the mean pressure in pounds per square inch, the length of the stroke in feet, and the number of strokes per minute; and dividing by 33,000.

Water-wheels yield from 50 to 91 per cent of the water. The actual power of a steam-engine is less than the indicated power, owing to a loss from friction; the amount of this loss varies with the arrangement of the engine and the perfection of the workmanship.

ZUR BEACHTUNG FÜR DEUTSCHE ERFINDER.



Die Unterzeichneten haben eine Anleitung herausgegeben, welche angiebt was zu befolgen ist um ein Patent zu sichern, und selbige wird auf portofreie Anfrage gratis abgegeben.

Nach dem neuen Patent-Gesetz können Bürger aller Länder, mit einer einzigen Ausnahme, Patente in den Vereinigten Staaten zu denselben Bedingungen erlangen, wie die Bürger der Vereinigten Staaten selbst.

Munn & Co.,

No. 37 Park Row, New-York.

Scientific American Office.

SOMETHING TO BE REMEMBERED.

AMERICAN Patents, granted to foreigners, become invalid if the patent is not put and continued on sale, on reasonable terms, within eighteen months from the date of the patent. Law of 1836, section 15, page 61.

HEAT-CONDUCTING POWER OF DIFFERENT BODIES.

Gold,	1000	Tin,	3[illegible]
Platinum,	981	Lead,	1[illegible]
Silver,	973	Marble,	[illegible]
Copper,	898	Porcelain,	[illegible]
Iron,	374	Fire Clay,	[illegible]
Zinc,	363	Fire Brick,	11

RELATIVE CONDUCTING POWER OF FLUIDS.

Mercury,	1000	Proof Spirit,	312
Water,	357	Alcohol, (pure,)	282

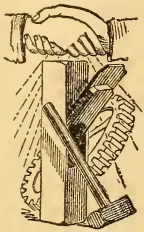
[From the Scientific American.]

FIELD FOR CHEMICAL INVENTION.

Less than five per cent of all the patents issued are for hemical inventions. The first impression which this fact eaves is that the chemists are not so wide awake as the nechanics. And it seems, too, as if the chemists have the est chance, for they have the range of all the combinaions, almost infinite in number, of all the sixty or more imple substances or elements, while the mechanic is limited n all his inventions to the use of only five mechanical elenents. But this course of reasoning is a little unfair for he chemist, if we wish to determine his real merit as a enefactor of mankind. Thus far the introduction of new ubstances has been too slow and too much the result of hance. Illuminating gas was known as a chemical product or centuries before any use of it was made; iodine, chromine, hloroform, aniline, and a hundred other things, now comnon, were for a very long time only rare specimens on the helves of the chemist's curiosity-shop, before they were ound to be of the greatest value to men, and we cannot ave a doubt that much more of the same kind of wealth is oon to be developed. May we not reasonably expect that irtues may be discovered in things now neglected, which vill directly lead to the invention of arts more wonderful nd more useful than photography or electro-telegraphing?

A correspondent, writing from Buffalo, says, in speaking of the value of The Scientific American to its host of readers: "I would as soon think of going without supper on Thursday night as to neglect to call at the book-store for the *Paper of papers;* and I am proud to say that I have influenced many others to 'go and do likewise.' I have my volumes complete and nicely bound from volume five; and should poverty ever compel me to sell my library, my *Bible* and my Scientific American should remain to grace the otherwise empty shelves."

A WORD TO INQUIRERS.



We frequently receive letters containing long strings of trifling questions, relative to all sorts of things, without any fee to pay us for our time in obtaining the information, nor even stamps for postage or stationery. Many of these correspondents close their letters with the comforting assurance that "I would remit for your trouble, but do not know how much to send." To relieve the consciences of all such doubters, we would recommend them to send a dollar or more, according to the value to them of the desired information. If the latter is of no value, they ought not to trouble us with their fly-tracks.

To certain other classes of inquirers the following hints may be useful: The best washing-machines, the best straw-cutters, the best churns, the best brick-machines, the best engines, the best sewing-machines, the best of every thing in the mechanical line, is advertised and illustrated in The Scientific American, and the address of the parties having such things on sale is there given. Write directly to them for the information you want, and spare us. If you cannot at first find what you desire, read the back numbers of The Scientific American. Do not expect us to do the work for you unless you send a small remittance.

To find the area of an ellipsis, multiply the long diameter by the short diameter and by .7854; the product will be the area.

Never relate your misfortunes, and never grieve over what you cannot prevent.

To find the area of a circle, multiply the square of the diameter by the decimal .7854. Or multiply the circumference by the radius, and divide the product by 2.

THE

PATENT LAWS

OF THE

UNITED STATES OF AMERICA.

☞ The following are the existing Laws under which American Patents are granted and supported by the courts.

To save space we omit such portions as have been repealed, or that relate to salaries of officials, and other unimportant details not pertaining to patents.

PATENT LAW OF 1836.

AN ACT to promote the progress of Useful Arts, and to repeal all acts and parts of acts heretofore made for that purpose.

ESTABLISHMENT OF THE PATENT OFFICE.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled: That there shall be established and attached to the Department of State,* an office, to be denominated the Patent Office, the chief officer of which shall be called the Commissioner of Patents, to be appointed by the President, by and with the advice and consent of the Senate, whose duty it shall be, under the direction of the Secretary of State, to superintend, execute, and perform all such acts and things touching and respecting the granting and issuing of patents for new and useful discoveries, inventions, and improvements,

* Now attached to Department of Interior.

as are herein provided for, or shall hereafter be, by law, directed to be done and performed, and shall have charge and custody of all the books, records, papers, models, and machines, and all other things belonging to said office, * * * and shall be entitled to send and receive letters and packages by mail, relating to the business of the office, free of postage.

SEC. 2. [Relates to the appointment of clerks and other officials.]

PATENT OFFICE EMPLOYEES MUST NOT BE INTERESTED IN PATENTS.

* * * And said Commissioner, clerks, and every other person appointed and employed in said office, shall be disqualified and interdicted from acquiring or taking, except by inheritance, during the period for which they shall hold their appointments respectively, any right or interest, directly or indirectly, in any patent for an invention or discovery which has been, or may hereafter be, granted.

SEC 3. [Relates to oaths and sureties of clerks.]

SEAL OF OFFICE, COPYING, ETC.

SEC. 4. *And be it further enacted*, That the said Commissioner shall cause a seal to be made and provided for the said office, with such devices as the President of the United States shall approve; and copies of any records, books, papers, or drawings, belonging to the said office, under the signature of the said Commissioner, or, when the office shall be vacant, under the signature of the chief clerk, with the said seal affixed, shall be competent evidence in all cases in which the original records, books, papers, or drawings could be evidence. And any person making application therefor may have certified copies of the records, drawings, and other papers deposited in said office, on paying for the written copies the sum of ten cents for every page of one hundred words; and for copies of drawings, the reasonable expenses of making the same.

RECORD OF PATENTS, ETC.

SEC. 5. *And be it further enacted*, That all patents issuing from said office shall be issued in the name of the

United States, and under the seal of said office, and be signed by the Secretary of State,* and countersigned by the Commissioner of said office, and shall be recorded, together with the descriptions, specifications, and drawings, in the said office, in books to be kept for that purpose. Every such patent shall contain a short description or title of the invention or discovery, correctly indicating its nature and design, and in its terms grant to the applicant or applicants, his or their heirs, administrators, executors, or assigns, for a term not exceeding fourteen years, [changed to seventeen years,] the full and exclusive right and liberty of making, using, and vending to others to be used, the said invention or discovery, referring to the specifications for the particulars thereof, a copy of which shall be annexed to the patent, specifying what the patentee claims as his invention or discovery.

WHO MAY OBTAIN PATENTS, AND HOW.

SEC. 6. *And be it further enacted*, That any person or persons having discovered or invented any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used by others before his or their discovery or invention thereof, and not at the time of his application for a patent in public use or on sale, with his consent or allowance, as the inventor or discoverer, and shall desire to obtain an exclusive property therein, may make application, in writing, to the Commissioner of Patents, expressing such desire; and the Commissioner, on due proceedings had, may grant a patent therefor. But before any inventor shall receive a patent for any such new invention or discovery, he shall deliver a written description of his invention or discovery, and of the manner and process of making, constructing, using, and compounding the same, in such full clear, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of

* Secretary of the Interior. See Section Law of 1849, page 72.

any machine, he shall fully explain the principle, and the several modes in which he has contemplated the application of that principle or character by which it may be distinguished from other inventions; and shall particularly specify and point out the part, improvement, or combination which he claims as his own invention or discovery. He shall, furthermore, accompany the whole with a drawing or drawings, and written references, where the nature of the case admits of drawings; or with specimens of ingredients, and of the composition of matter, sufficient in quantity for the purpose of experiment, where the invention or discovery is of a composition of matter; which descriptions and drawings, signed by the inventor, and attested by two witnesses, shall be filed in the Patent Office; and he shall, moreover, furnish a model of his invention, in all cases which admit of a representation by model, of a convenient size to exhibit advantageously its several parts. The applicant shall make oath or affirmation that he does verily believe that he is the original and first inventor or discoverer of the art, machine, composition, or improvement for which he solicits a patent; and that he does not know or believe that the same was ever before known or used; and also of what country he is a citizen; which oath or affirmation may be made before any person authorized by law to administer oaths.

OFFICIAL EXAMINATIONS.

SEC. 7. *And be it further enacted*, That on the filing of any such application, description, and specification, and the payment of the duty hereinafter provided,* the Commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery; and if, on any such examination, it shall not appear to the Commissioner that the same had been invented or discovered by any other person in this country, prior to the alleged invention or discovery thereof by the applicant, or that it had been patented or described in any printed publication in this or any foreign country, or had been in public use or on sale, with the ap-

* See Section 10, page 76.

plicant's consent or allowance, prior to the application, if the Commissioner shall deem it to be sufficiently useful and important, it shall be his duty to issue a patent therefor. But whenever, on such examination, it shall appear to the Commissioner that the applicant was not the original and first inventor or discoverer thereof, or that any part of that which is claimed as new had before been invented or discovered, or patented or described in any printed publication in this or any foreign country as aforesaid, or that the description is defective and insufficient, he shall notify the applicant thereof, giving him briefly such information and references as may be useful in judging of the propriety of renewing his application, or of altering his specification to embrace only that part of the invention or discovery which is new. * * *

INTERFERENCES.

SEC. 8. *And be it further enacted*, That whenever an application shall be made for a patent, which, in the opinion of the Commissioner, would interfere with any other patent for which an application may be pending, or with any unexpired patent which shall have been granted, it shall be the duty of the Commissioner to give notice thereof to such applicants or patentees, as the case may be; and if either shall be dissatisfied with the decision of the Commissioner on the question of priority of right or invention, on a hearing thereof, he may appeal from such decision, on the like terms and conditions as are provided in the preceding section of this act, and the like proceedings shall be had, to determine which, or whether either, of the applicants is entitled to receive a patent as prayed for. But nothing in this act contained shall be construed to deprive an original and true inventor of the right to a patent for his invention by reason of his having previously taken out letters patent therefor in a foreign country, and the same having been published at any time within six months next preceding the filing of his specification and drawings. * * *

SEC. 9. [Relates to patent fees. This section fixed the fee for American citizens at thirty dollars; subjects of Great Britain five hundred dollars, and all other persons three

hundred dollars. This was changed by the law of 1861, (see Section 10, page 76.) All persons, without distinction as to nationality, now pay thirty-five dollars, except the inhabitants of those countries that discriminate against American citizens. In Canada, an American cannot obtain patents. Hence Canadians are charged five hundred dollars for an American patent. It is expected that the Canadian law will be changed so as to remove this discrimination.]

THE HEIRS OF AN INVENTOR MAY OBTAIN A PATENT.

SEC. 10. *And be it further enacted*, That where any person hath made, or shall have made, any new invention, discovery, or improvement, on account of which a patent might by virtue of this act be granted, and such person shall die before any patent shall be granted therefor, the right of applying for and obtaining such patent shall devolve on the executor or administrator of such person, in trust for the heirs-at-law of the deceased, in case he shall have died intestate; but if otherwise, then in trust for his devisees, in as full and ample manner, and under the same conditions, limitations, and restrictions as the same was held, or might have been claimed or enjoyed, by such person in his or her lifetime; and when application for a patent shall be made by such legal representatives, the oath or affirmation provided in the 6th section of this act shall be so varied as to be applicable to them.

PATENTS MAY BE ASSIGNED.

SEC. 11. *And be it further enacted*, That every patent shall be assigned in law, either as to the whole interest or any undivided part thereof, by any instrument in writing; which assignment, and also every grant and conveyance of the exclusive right, under any patent, to make and use, and to grant to others to make and use, the thing patented within and throughout any specified part or portion of the United States, shall be recorded in the Patent Office within three months from the execution thereof. * * *

CAVEATS.

SEC. 12. *And be it further enacted*, That any citizen of the United States, or alien who shall have been a resident of the United States one year next preceding, and shall have made oath of his intention to become a citizen thereof, who shall have invented any new art, machine, or improvement thereof, and shall desire further time to mature the same, may * * * file in the Patent Office a caveat setting forth the design and purpose thereof, and its principal and distinguishing characteristics, and praying protection of his right till he shall have matured his invention. * * * And such caveat shall be filed in the confidential archives of the office, and preserved in secrecy. And if application shall be made by any other person, within one year from the time of filing such caveat, for a patent of any invention with which it may in any respect interfere, it shall be the duty of the Commissioner to deposit the description, specifications, drawings, and model, in the confidential archives of the office, and to give notice (by mail) to the person filing the caveat of such application, *who shall within three months* after receiving the notice, if he would avail himself of the benefit of his caveat, file his description, specifications, drawings, and model; and if, in the opinion of the Commissioner, the specifications of claim interfere with each other, like proceedings may be had in all respects as are in this act provided in the case of interfering applications; *Provided, however*, That no opinion or decision * * * under the provisions of this act, shall preclude any person interested in favor of or against the validity of any patent which has been or may hereafter be granted, from the right to contest the same in any judicial court, in any action in which its validity may come in question.

RE-ISSUES.

SEC. 13. *And be it further enacted*, That whenever any patent which has heretofore been granted, or which shall hereafter be granted, shall be inoperative or invalid, by reason of a defective or insufficient description or specification, or by reason of the patentee claiming in his specification, as his own invention, more than he had or shall have a

right to claim as new, if the error has or shall have arisen by inadvertency, accident, or mistake, and without any fraudulent or deceptive intention, it shall be lawful for the Commissioner, upon the surrender to him of such patent, * * * to cause a new patent to be issued to the said inventor for the same invention, for the residue of the period then unexpired for which the original patent was granted, in accordance with the patentee's corrected description and specification.* And in case of his death or any assignment by him made of the original patent, a similar right shall vest in his executors, administrators, or assignees. And the patent so reissued, together with the corrected description and specifications, shall have the same effect and operation in law, on the trial of all actions hereafter commenced for causes subsequently accruing, as though the same had been originally filed in such corrected form, before the issuing of the original patent.* * * *

SUITS AT LAW.

SEC. 14. *And be it further enacted*, That whenever, in any action for damages [for] making, using, or selling the thing whereof the exclusive right is secured by any patent heretofore granted, or by any patent which may hereafter be granted, a verdict shall be rendered for the plaintiff in such action, it shall be in the power of the court to render judgment of any sum above the amount found by such verdict as the actual damages sustained by the plaintiff, not exceeding three times the amount thereof, according to the circumstances of the case, with costs; and such damages may be recovered by action on the case, in any court of competent jurisdiction, to be brought in the name or names of the person or persons interested, whether as patentee, assignee, or as grantees of the exclusive right within and throughout a specified part of the United States.

SUITS AT LAW.—FOREIGN PATENTS INVALID IF THE INVENTION IS NOT PUT ON SALE WITHIN EIGHTEEN MONTHS FROM THE DATE OF PATENT.

SEC. 15. *And be it further enacted*, That the defendant in any such action shall be permitted to plead the general

* See Section 5, page 65.

issue, and to give this act and any special matter in evidence, of which notice in writing may have been given to the plaintiff or his attorney, thirty days before trial, tending to prove that the description and specification filed by the plaintiff does not contain the whole truth relative to his invention or discovery, or that it contains more than is necessary to produce the described effect; which concealment or addition shall fully appear to have been made for the purpose of deceiving the public, or that the patentee was not the original and first inventor or discoverer of the thing patented, or of a substantial and material part thereof claimed as new, or that it has been described in some public work anterior to the supposed discovery thereof by the patentee, or had been in public use or on sale with the consent and allowance of the patentee before his application for a patent, or that he had surreptitiously or unjustly obtained the patent for that which was in fact invented or discovered by another, who was using reasonable diligence in adapting and perfecting the same; or that the patentee, if an alien at the time the patent was granted, had failed and neglected, for the space of eighteen months from the date of the patent, to put and continue on sale to the public, on reasonable terms, the invention or discovery for which the patent issued; and whenever the defendant relies in his defence on the fact of a previous invention, knowledge, or use of the thing patented, he shall state, in his notice of special matters, the names and places of residence of those whom he intends to prove to have possessed a prior knowledge of the thing, and where the same had been used; in either of which cases judgment shall be rendered for the defendant with costs: *Provided, however*, That whenever it shall satisfactorily appear that the patentee, at the time of making his application for the patent, believing himself to be the first inventor or discoverer of the thing patented, the same shall not be held to be void on account of the invention or discovery, or any part thereof, having been before known or used in any foreign country; it not appearing that the same or any substantial part thereof had before been patented or described in any printed publication: *And provided, also*, That whenever the plaintiff shall fail to sustain his action on the ground that in his specification or claim is

embraced more than that of which he was the first inventor, if it shall appear that the defendant had used or violated any part of the invention justly and truly specified and claimed as new, it shall be in the power of the court to adjudge and award, as to costs, as may appear to be just and equitable.* * * *

PATENTS MAY BE DECLARED VOID.

SEC. 16. *And be it further enacted*, That whenever there shall be two interfering patents, or whenever a patent or application shall have been refused * * * on the ground that that patent applied for would interfere with an unexpired patent previously granted, any person interested in any such patent, either by assignment or otherwise in the one case, and any such applicant in the other case, may have remedy by bill in equity; and the court having cognizance thereof, on notice to adverse parties, and other due proceedings had, may adjudge and declare either the patents void in the whole or in part, or inoperative and invalid in any particular part or portion of the United States, according to the interest which the parties to such suit may possess in the patent or the inventions patented; and may also adjudge that such applicant is entitled, according to the principles and provisions of this act, to have and receive a patent for his invention, as specified in his claim, or for any part thereof, as the fact of priority of right or invention shall, in any such case, be made to appear. And such adjudication, if it be in favor of the right of such applicant, shall authorize the Commissioner to issue such patent, on his filing a copy of the adjudication, and otherwise complying with the requisitions of this act: *Provided, however*, That no such judgment or adjudication shall affect the rights of any person, except the parties to the action, and those deriving title from or under them subsequent to the rendition of such judgment.*

COURTS TO HAVE POWERS, ETC.

SEC. 17. *And be it further enacted*, That all actions, suits, controversies, and cases arising under any law of the United

* See Section 9, page 66.

States, granting or confirming to inventors the exclusive right to their inventions or discoveries, shall be originally cognizable, as well in equity as at law, by the circuit courts of the United States, or any district court having the powers and jurisdiction of a circuit court; which courts shall have power, upon a bill in equity filed by any party aggrieved, in any such case, to grant injunctions according to the course and principles of courts of equity, to prevent the violation of the rights of any inventor as secured to him by any law of the United States, on such terms and conditions as said courts may deem reasonable: *Provided, however*, That from all judgments and decrees from any such court rendered in the premises, a writ of error or appeal, as the case may require, shall lie to the Supreme Court of the United States, in the same manner and under the same circumstances as is now provided by law in other judgments and decrees of circuit courts, and in all other cases in which the court shall deem it reasonable to allow the same.

EXTENSION OF PATENTS.

SEC. 18. *And be it further enacted*, That whenever any patentee of an invention or discovery shall desire an extension of his patent beyond the term of its limitation,* he may make application therefor, in writing, to the Commissioner of the Patent Office, setting forth the grounds thereof; and the Commissioner shall * * * cause to be published in one or more of the principal newspapers in the City of Washington, and in such other paper or papers as he may deem proper, published in the section of country most interested adversely to the extension of the patent, a notice of such application, and of the time and place when and where the same will be considered, that any person may appear and show cause why the extension should not be granted. And the Secretary of State, the Commissioner of the Patent Office, and the Solicitor of the Treasury shall constitute a board † to hear and decide upon the evidence

* See Section 11, page 76, and Section 16, page 79.
† Repealed—See Section 1, page 71.

produced before them, both for and against the extension, and shall sit for that purpose at the time and place designated in the published notice thereof. The patentee shall furnish a statement, in writing, under oath, of the ascertained value of the invention, and of his receipts and expenditures, sufficiently in detail to exhibit a true and faithful account of loss and profit in any manner accruing to him from and by reason of said invention. And if, upon a hearing of the matter, it shall appear to the full and entire satisfaction of said [Commissioner], having due regard to the public interest therein, that it is just and proper that the term of the patent should be extended, by reason of the patentee, without neglect or fault on his part, having failed to obtain, from the use and sale of his invention, a reasonable remuneration for the time, ingenuity, and expense bestowed upon the same, and the introduction thereof into use, it shall be the duty of the Commissioner to renew and extend the patent, by making a certificate thereon of such extension, for the term of seven years from and after the expiration of the first term; * * * and thereupon the said patent shall have the same effect in law as though it had been originally granted for the term of twenty-one years; and the benefit of such renewal shall extend to assignees and grantees of the right to use the thing patented, to the extent of their respective interests therein: *Provided, however*, That no extension of a patent shall be granted after the expiration of the term for which it was originally issued.

SEC. 19. [Relates to books, etc., for a library.]

SEC. 20. [Relates to the classification, and public exhibition of models, etc., in the Patent Office.]

SEC. 21. [Relates to actions and cases sued or pending under previous laws.]

Approved July 4, 1836.

PATENT LAW OF 1837.

[Sections 1, 2, 3, 4, relate to means for obtaining new copies of the patents, records, and models, which were destroyed by the burning of the Patent Office in December, 1836. Only a small portion of the old patents and models were ever obtained under this act.]

A PATENT MAY BE DIVIDED INTO SEVERAL SEPARATE PATENTS.

SEC. 5. *And be it further enacted*, That whenever a patent shall be returned for correction and reïssue, under the thirteenth section of the act [of 1836] to which this is additional, and the patentee shall desire several patents to be issued for distinct and separate parts of the thing patented, he shall first pay, in manner and in addition to the sum provided by that act, the sum of thirty dollars for each additional patent so to be issued.

ASSIGNMENTS, DRAWINGS, ETC.

SEC. 6. *And be it further enacted*, That any patent hereafter to be issued may be made and issued to the assignee or assignees of the inventor or discoverer, the assignment thereof being first entered of record, and the application therefor being duly made, and the specification duly sworn to by the inventor. And in all cases hereafter the applicant for a patent shall be held to furnish duplicate drawings, whenever the case admits of drawings, one of which to be deposited in the office, and the other to be annexed to the patent, and considered a part of the specification.

DISCLAIMERS.

SEC. 7. *And be it further enacted*, That whenever any patentee shall have, through inadvertence, accident, or mistake, made his specification of claim too broad, claiming more than that of which he was the original or first inventor, some material and substantial part of the thing patented being truly and justly his own, any such patentee, his administrators, executors, and assigns, whether of the whole or of a sectional interest therein, may make disclaimer of such parts of the thing patented as the disclaimant shall not

claim to hold by virtue of the patent or assignment, stating therein the extent of his interest in such patent; which disclaimer shall be in writing, attested by one or more witnesses, and recorded in the Patent Office, on payment by the person disclaiming, in manner as other patent duties are required by law to be paid, of the sum of ten dollars. And such disclaimer shall thereafter be taken and considered as part of the original specification, to the extent of the interest which shall be possessed in the patent or right secured thereby, by the disclaimant, and by those claiming by or under him, subsequent to the record thereof. But no such disclaimer shall affect any action pending at the time of its being filed, except so far as may relate to the question of unreasonable neglect or delay in filing the same.

REISSUES

SEC. 8. *And be it further enacted*, That whenever application shall be made to the Commissioner for any addition of a newly discovered improvement to be made to an existing patent, or whenever a patent shall be returned for correction and reïssue, the specification of claim annexed to every such patent shall be subject to revision and restriction, in the same manner as are original applications for patents; the Commissioner shall not add any such improvement to the patent in the one case, nor grant the reïssue in the other case, until the applicant shall have entered a disclaimer, or altered his specification of claim in accordance with the decision of the Commissioner; and in all such cases the applicant, if dissatisfied with such decision, shall have the same remedy, and be entitled to the benefit of the same privileges and proceedings as are provided by law in the case of original applications for patents. [See change as to additional improvements, law of 1861, page 75, section 9.]

VALIDITY OF PARTS OF THE PATENT.

SEC. 9. *And be it further enacted*, (any thing in the fifteenth section of the act to which this is additional to the contrary notwithstanding,) That whenever, by mistake, accident, or inadvertence, and without any wilful default or intent to defraud or mislead the public, any patentee shall

have, in his specification, claimed to be the original and first inventor or discoverer of any material or substantial part of the thing patented, of which he was not the first and original inventor, and shall have no legal or just right to claim the same, in every such case the patent shall be deemed good and valid for so much of the invention or discovery as shall be truly and *bona fide* his own: *Provided*, It shall be a material and substantial part of the thing patented, and be definitely distinguishable from the other parts so claimed without right as aforesaid. And every such patentee, his executors, administrators, and assigns, whether of a whole or of a sectional interest therein, shall be entitled to maintain a suit at law or in equity on such patent for any infringement of such part of the invention or discovery as shall be *bona fide* his own as aforesaid, notwithstanding the specification may embrace more than he shall have any legal right to claim. But in every such case in which a judgment or verdict shall be rendered for the plaintiff, he shall not be entitled to recover costs against the defendant, unless he shall have entered at the Patent Office, prior to the commencement of the suit, a disclaimer of all that part of the thing patented which was so claimed without right: *Provided, however*, That no person bringing any such suit shall be entitled to the benefits of the provisions contained in this section who shall have unreasonably neglected or delayed to enter at the Patent Office a disclaimer as aforesaid.

SEC. 10. [Repealed. Related to model agents.]

SEC. 11. [Relates to clerks and copying.]

SEC. 12. [Relates to refunding of money in rejected cases, which by the law of 1861, section 9, is forbidden.]

OATH OR AFFIRMATION.

SEC. 13. *And be it further enacted*, That in all cases in which an oath is required by this act, or by the act to which this is additional, if the person of whom it is required shall be conscientiously scrupulous of taking an oath, affirmation may be substituted therefor.

SEC. 14. [Relates to salaries and expenses of the Patent Office, Commissioner's report, etc.]

Approved March 3, 1837.

PATENT LAW OF 1839.

SEC. 1, 2, 3, 4, 5, relate to employés at the Patent Office, expenses thereof, patent lists, and books.

FOREIGN INVENTIONS MAY BE PATENTED IF NOT PUBLICLY INTRODUCED PRIOR TO THE APPLICATION.

SEC. 6. *And be it further enacted*, That no person shall be debarred from receiving a patent for any invention or discovery, as provided in the act approved on the fourth day of July, one thousand eight hundred and thirty-six, to which this is additional, by reason of the same having been patented in a foreign country more than six months prior to his application: *Provided*, That the same shall not have been introduced into public and common use in the United States prior to the application for such patent: *And provided, also*, That in all cases every such patent shall be limited to the term of fourteen* years from the date or publi cation of such foreign letters patent.

MACHINES, ETC., MADE PRIOR TO THE PATENT MAY BE CONTINUED IN USE AFTER ISSUE OF THE PATENT.

SEC. 7. *And be it further enacted*, That every person or corporation who has, or shall have, purchased or constructed any newly invented machine, manufacture, or composition of matter, prior to the application by the inventor or discoverer for a patent, shall be held to possess the right to use, and vend to others to be used, the specific machine, manufacture, or composition of matter so made or purchased, without liability therefor to the inventor, or any other person interested in such invention; and no patent shall be held to be invalid by reason of such purchase, sale, or use, prior to the application for a patent as aforesaid, except on proof of abandonment of such invention to the public, or that such purchase, sale, or prior use, has been for more than two years prior to such application for a patent.

SEC. 8. [Relates to fees for recording, since changed.]

SEC. 9. [Relates to agricultural statistics.]

* Changed to seventeen years by the law of 1861. See page 79, section 16.

CONTESTED CASES.

SEC. 10. *And be it further enacted*, That the provisions of the sixteenth section of the before-recited act (law of 1836) shall extend to all cases where patents are refused for any reason whatever, either by the Commissioner of Patents or by the Chief-Justice of the District of Columbia, upon appeals from the decision of said Commissioner, as well as where the same shall have been refused on account of, or by reason of, interference with a previously existing patent; and in all cases where there is no opposing party a copy of the bill shall be served upon the Commissioner of Patents, when the whole of the expenses of the proceeding shall be paid by the applicant, whether the final decision shall be in his favor or otherwise.

APPEALS.

SEC. 11. *And be it further enacted*, That in cases where an appeal is now allowed by law from the decision of the Commissioner of Patents * * * the party, * * * shall have right to appeal to the Chief-Justice of the District Court of the United States for the District of Columbia, by giving notice thereof to the Commissioner, and filing in the Patent Office, within such time as the Commissioner shall appoint, his reasons of appeal, specifically set forth in writing, and also paying into the Patent Office, to the credit of the patent fund, the sum of twenty-five dollars. And it shall be the duty of said Chief-Justice, on petition, to hear and determine all such appeals, and to revise such decisions in a summary way, on the evidence produced before the Commissioner, at such early and convenient time as he may appoint, first notifying the Commissioner of the time and place of hearing, whose duty it shall be to give notice thereof to all parties who appear to be interested therein, in such manner as said judge shall prescribe. The Commissioner shall also lay before the said judge all the original papers and evidence in the case, together with the grounds of his decision, fully set forth in writing, touching all the points involved by the reasons of appeal, to which the revision shall be confined. And at the request of any party interested, or at the desire of the judge, the Commissioner

and the examiners in the Patent Officer may be examined, under oath, in explanation of the principles of the machine, or other thing, for which a patent in such case is prayed for. And it shall be the duty of the said judge, after a hearing of any such case, to return all the papers to the Commissioner, with a certificate of his proceedings and decision, which shall be entered of record in the Patent Office ; and such decision, so certified, shall govern the further proceedings of the Commissioner in such case: *Provided, however*, That no opinion or decision of the judge in any such case shall preclude any person interested in favor or against the validity of any patent which has been, or may hereafter be, granted, from the right to contest the same in any judicial court, in any action in which its validity may come in question.

SEC. 12. [Relates to rules in contested cases, and to examiners, but has been changed.]

SEC. 13. [Relates to fees to the justice.]

Approved March 3, 1839.

PATENT LAW OF 1842.

SECTION 1. [Authorizes the refunding of money paid by mistake in certain cases.]

SEC. 2. [Relates to patent records that were destroyed by fire in 1836.]

SEC. 3. [Repealed.]

TAKING THE OATH IN FOREIGN COUNTRIES.

SEC. 4. *And be it further enacted*, That the oath required for applicants for patents may be taken, when the applicant is not, for the time being, residing in the United States, before any minister plenipotentiary, chargé d'affaires, consul, or commercial agent holding commission under the government of the United States, or before any notary public of the foreign country in which such applicant may be.

PENALTY FOR STAMPING UNPATENTED ARTICLES.

SEC. 5. *And be it further enacted*, That if any person or persons shall paint, or print, or mould, cast, carve, or en-

grave, or stamp upon any thing made, used, or sold by him, for the sole making or selling which he hath not, or shall not have, obtained letters patent, the name, or any imitation of the name of any other person who hath, or shall have, obtained letters patent for the sole making and vending of such thing, without consent of such patentee, or his assigns or legal representatives; or if any person, upon any such thing not having been purchased from the patentee, or some person who purchased it from or under such patentee, or not having the license or consent of such patentee, or his assigns or legal representatives, shall write, paint, print, mould, cast, carve, engrave, stamp, or otherwise make or affix the word "patent," or the words "letters patent," or the word "patentee," or any word or words of like kind, meaning, or import, with the view or intent of imitating or counterfeiting the stamp, mark, or other device of the patentee, or shall affix the same, or any word, stamp, or device of like import, on any unpatented article, for the purpose of deceiving the public, he, she, or they, so offending, shall be liable for such offence to a penalty of not less than one hundred dollars, with costs, to be recovered by action in any of the circuit courts of the United States, or in any of the district courts of the United States having the powers and jurisdiction of a circuit court; one half of which penalty, as recovered, shall be paid to the patent fund, and the other half to any person who shall sue for the same.

SEC. 6. [Repealed.]

Approved August 29, 1842.

PATENT LAW OF 1848.

THE COMMISSIONER TO EXTEND PATENTS.

Be it enacted, etc., * * * That the power to extend patents, shall hereafter be vested solely in the Commissioner of Patents; and when an application is made to him for the extension of a patent, * * * he shall refer the case to the principal examiner having charge of the class of inventions to which said case belongs, who shall make a full report to

said Commissioner of the said case, and particularly whether the invention or improvement secured in the patent was new and patentable when patented; * * * but no patent shall be extended for a longer term than seven years.

SEC. 2. [Relates to record fees—since changed.]

SEC. 3. [Relates to clerks and copying.]

SEC. 4. [Relates to Patent Reports, etc.]

Approved May 27, 1848.

PATENT LAW OF 1849.

And be it further enacted, That the Secretary of the Interior shall exercise and perform all the acts of supervision and appeal in regard to the office of Commissioner of Patents, now exercised by the Secretary of State.

PATENT LAW OF 1852.

JUDGES TO HEAR APPEALS.

Be it enacted, etc., That appeals provided for in the eleventh section of the act, (law of 1839,) * * * may also be made to either of the assistant judges of the Circuit Court of the District of Columbia; and all the powers, duties, and responsibilities imposed by the aforesaid act, and conferred upon the chief judge, are hereby imposed and conferred upon each of the said assistant judges.

SEC. 2. *And be it further enacted*, That in case appeal shall be made to the said chief judge, or to either of the said assistant judges, the Commissioner of Patents shall pay to such chief judge, or assistant judge, the sum of twenty-five dollars, required to be paid by the appellant into the Patent Office by the eleventh section of said act, on said appeal.

SEC. 3. [Repeals a former section relating to a fee to the justice.]

Approved August 30, 1852.

PATENT LAW OF 1861.

COMMISSIONER TO ISSUE SUBPŒNAS, ETC.[1]

Be it enacted, etc., That the Commissioner of Patents may establish rules for taking affidavits and depositions required in cases pending in the Patent Office, and such affidavits and depositions may be taken before any justice of the peace or other officer authorized by law to take depositions to be used in the courts of the United States, or in the State courts of any State where such officer shall reside; and in any contested case pending in the Patent Office it shall be lawful for the clerk of any court of the United States for any district or Territory, and he is hereby required, upon the application of any party to such contested case, or the agent or attorney of such party, to issue subpœnas for any witnesses residing or being within the said district or Territory, commanding such witnesses to appear and testify before any justice of the peace, or other officer as aforesaid, residing within the said district or Territory, at any time and place in the subpœna to be stated; and if any witness, after being duly served with such subpœna, shall refuse or neglect to appear, or, after appearing, shall refuse to testify, (not being privileged from giving testimony,) such refusal or neglect being proved to the satisfaction of any judge of the court whose clerk shall have issued such subpœna, said judge may thereupon proceed to enforce obedience to the process, or to punish the disobedience in like manner as any court of the United States may do in case of disobedience to process of *subpœna ad testificandum* issued by such court; and witnesses in such cases shall be allowed the same compensation as is allowed to witnesses attending the courts of the United States: *Provided*, That no witness shall be required to attend at any place more than forty miles from the place where the subpœna shall be served upon him to give a deposition under this law: *Provided also*, That no witness shall be deemed guilty of contempt for refusing to disclose any secret invention made or owned by him: *And provided, further*, That no witness shall be deemed guilty of contempt for disobeying any subpœna directed to him by virtue of this act, unless his fees for going to, returning

from, and one day's attendance at the place of examination shall be paid or tendered him at the time of the service of the subpœna.

EXAMINERS-IN-CHIEF.

SEC. 2. *And be it further enacted*, That for the purpose of securing greater uniformity of action in the grant and refusal of letters patent, there shall be appointed by the President, by and with the advice and consent of the Senate, three examiners-in-chief, at an annual salary of three thousand dollars each, to be composed of persons of competent legal knowledge and scientific ability, whose duty it shall be, on the written petition of the applicant for that purpose being filed, to revise and determine upon the validity of decisions made by examiners when adverse to the grant of letters patent; and also to revise and determine in like manner upon the validity of the decisions of examiners in interference cases, and when required by the Commissioner in applications for the extension of patents, and to perform such other duties as may be assigned to them by the Commissioner; that from their decisions appeals may be taken to the Commissioner of Patents in person, upon payment of the fee hereinafter prescribed; that the said examiners-in-chief shall be governed in their action by the rules to be prescribed by the Commissioner of Patents.

SEC. 3. *And be it further enacted.* That no appeal shall be allowed to the examiners-in-chief from the decisions of the primary examiners, except in interference cases, until after the application shall have been twice rejected. * * *

SEC. 4. [Relates to salaries.]

RETURN OF MODELS.

SEC. 5. *And be it further enacted*, That the Commissioner of Patents is authorized to restore to the respective applicants, or when not removed by them, to otherwise dispose of such of the models belonging to rejected applications as he shall not think necessary to be preserved. The same authority is also given in relation to all models accompanying applications for designs. He is further authorized to

dispense in future with models of designs when the design can be sufficiently represented by a drawing.

SEC. 6. [Repeals agencies for models.]

SEC. 7. [Relates to clerks.]

PAPERS MUST BE PROPERLY PREPARED.

SEC. 8. *And be it further enacted*, That the Commissioner may require all papers filed in the Patent Office, if not correctly, legibly, and clearly written, to be printed at the cost of the parties filing such papers; and for gross misconduct he may refuse to recognize any person as a patent agent, either generally or in any particular case; but the reasons of the Commissioner for such refusal shall be duly recorded, and subject to the approval of the President of the United States.

NO MONEY RETURNED ON REJECTED CASES.

SEC. 9. *And be it further enacted*, That no money paid as a fee on any application for a patent after the passage of this act shall be withdrawn or refunded; nor shall the fee paid on filing a caveat be considered as part of the sum required to be paid on filing a subsequent application for a patent for the same invention.

That the three months' notice given to any caveator in pursuance of the requirements of the twelfth section of the act of July fourth, eighteen hundred and thirty-six, shall be computed from the day on which such notice is deposited in the post-office at Washington, with the regular time for the transmission of the same added thereto, which time shall be indorsed on the notice; and that so much of the thirteenth section of the act of Congress, approved July fourth, eighteen hundred and thirty-six, as authorizes the annexing to letters patent of the description and specification of additional improvements, is hereby repealed, and in all cases where additional improvements would now be admissible independent patents must be applied for.

SCHEDULE OF OFFICIAL FEES.

SEC. 10. *And be it further enacted*, That all laws now in force fixing the rates of the Patent Office fees to be paid,

and discriminating between the inhabitants of the United States and those of other countries which shall not discriminate against the inhabitants of the United States, are hereby repealed, and in their stead the following rates are established:

On filing each caveat, ten dollars.

On filing each original application for a patent, except for a design, fifteen dollars.

On issuing each original patent, twenty dollars.

On every appeal from the examiners-in-chief to the Commissioner, twenty dollars.

On every application for the reïssue of a patent, thirty dollars.

On every application for the extension of a patent, fifty dollars; and fifty dollars, in addition, on the granting of every extension.

On filing each disclaimer, ten dollars.

For certified copies of patents and other papers, ten cents per hundred words.

For recording every assignment, agreement, power of attorney, and other papers, of three hundred words or under, one dollar.

For recording every assignment and other papers over three hundred and under one thousand words, two dollars.

For recording every assignment or other writing, if over one thousand words, three dollars.

For copies of drawings, the reasonable cost of making the same.

PATENTS FOR DESIGNS.

SEC. 11. *And be it further enacted*, That any citizen or citizens, or alien or aliens, having resided one year in the United States, and taken the oath of his or their intention to become a citizen or citizens, who by his, her, or their own industry, genius, efforts, and expense, may have invented or produced any new and original design for a manufacture, whether of metal or other material or materials, and original design for a bust, statue, or bas-relief, or composition in alto or basso relievo, or any new and original impression or ornament, or to be placed on any article of

manufacture, the same being formed in marble or other material, or any new and useful pattern, or print, or picture, to be either worked into or worked on, or printed or painted or cast, or otherwise fixed on any article of manufacture, or any new and original shape or configuration of any article of manufacture, not known or used by others before his, her, or their invention or production thereof, and prior to the time of his, her, or their application for a patent therefor, and who shall desire to obtain an exclusive property or right therein to make, use, and sell, and vend the same, or copies of the same to others, by them to be made, used, and sold, may make application in writing to the Commissioner of Patents, expressing such desire; and the Commissioner, on due proceedings had, may grant a patent therefor, as in the case now of application for a patent, for for the term of three and one half years, or for the term of seven years, or for the term of fourteen years, as the said applicant may elect in his application: *Provided*, That the fee to be paid in such application shall be for the term of three years and six months, ten dollars; for seven years, fifteen dollars; and for fourteen years, thirty dollars: *And provided*, That the patentees of designs under this act shall be entitled to the extension of their respective patents, for the term of seven years from the day on which said patents shall expire, upon the same terms and restrictions as are now provided for the extension of letters patent.

APPLICATIONS MUST BE COMPLETED WITHIN TWO YEARS.

SEC. 12. *And be it further enacted*, That all applications for patents shall be completed and prepared for examination within two years after the fiilng of the petition, and in default thereof they shall be regarded as abandoned by the parties thereto, unless it be shown, to the satisfaction of the Commissioner of Patents, that such delay was unavoidable; and all applications now pending shall be treated as if filed after the passage of this act; and all applications for the extension of patents shall be filed at least ninety days before the expiration thereof, and notice of the day

set for the hearing of the case shall be published, as now required by law, for at least sixty days.

PATENTED ARTICLES TO BE STAMPED.

SEC. 13. *And be it further enacted*, That in all cases where an article is made or vended by any person under the protection of letters patent, it shall be the duty of such person to give sufficient notice to the public that said article is so patented, either by fixing thereon the word patented, together with the day and year the patent was granted, or when, from the character of the article patented, that may be impracticable, by enveloping one or more of the said articles, and affixing a label to the package, or otherwise attaching thereto a label, on which the notice, with the date, is printed; on failure of which, in any suit for the infringement of letters patent by the party failing so to mark the article the right to which is infringed upon, no damage shall be recovered by the plaintiff, except on proof that the defendant was duly notified of the infringement, and continued after such notice to make or vend the article patented. * * *

PATENTS MAY BE PRINTED.

SEC. 14. *And be it further enacted*, That the Commissioner of Patents be, and he is hereby, authorized to print, or in his discretion to cause to be printed, ten copies of the description and claims of all patents which may hereafter be granted, and ten copies of the drawings of the same, when drawings shall accompany the patents: *Provided*, The cost of printing the text of said descriptions and claims shall not exceed, exclusive of stationery, the sum of two cents per hundred words for each of said copies, and the cost of the drawing shall not exceed fifty cents per copy; one copy of the above number shall be printed on parchment, to be affixed to the letters patent; the work shall be under the direction, and subject to the approval, of the Commissioner of Patents, and the expense of the said copies shall be paid for out of the patent fund.

SEC. 15. *And be it further enacted*, That printed copies

of the letters patent of the United States, with the seal of the Patent Office affixed thereto, and certified and signed by the Commissioner of Patents, shall be legal evidence of the contents of said letters patents in all cases.

PATENTS GRANTED FOR SEVENTEEN YEARS. EXTENSIONS PROHIBITED.

SEC. 16. *And be it further enacted*, That all patents hereafter granted shall remain in force for the term of seventeen years from the date of issue; and all extension of such patents is hereby prohibited.

SEC. 17. *And be it further enacted*, That all acts and parts of acts heretofore passed, which are inconsistent with the provisions of this act, be, and the same are hereby, repealed.

Approved March 2, 1861.

PATENT LAW OF 1863.

SEC. 1. [Repeals the renewal of oath.]

SEC. 2. [Relates to clerks, etc.]

DATING OF PATENTS.

SEC. 3. *And be it further enacted*, That every patent shall be dated as of a day not later than six months after the time at which it was passed and allowed, and notice thereof sent to the applicant or his agent. And if the final fee for such patent be not paid within the said six months the patent shall be withheld, and the invention therein described shall become public property as against the applicant therefor:* *Provided*, That, in all cases where patents have been allowed previous to the passage of this act, the said six months shall be reckoned from the date of such passage.

Approved March 3, 1863.

* Modified. See law of 1865.

PATENT LAW OF 1865.

FORFEITED APPLICATIONS MAY BE REVIVED.

Be it enacted, That any person having an interest in an invention, whether as inventor or assignee, for which a patent was ordered to issue upon the payment of the final fee, as provided in section three of an act approved March third, eighteen hundred and sixty-three, but who has failed to make payment of the final fee as provided in said act, shall have the right to make an application for a patent for his invention the same as in the case of an original application, provided such application be made within two years after the date of the allowance of the original application: *Provided*, that nothing herein shall be so construed as to hold responsible in damages any persons who have manufactured or used any article or thing for which a patent aforesaid was ordered to issue.

This act shall apply to all cases now in the Patent Office, and also to such as shall hereafter be filed; and all acts or parts of acts inconsistent with this act are hereby repealed.

Approved March 3, 1865.

PRESSURE AND TEMPERATURE OF STEAM.

Pressure in lbs. per sq. in.	Corresponding Temperature, Fahrenheit.	Pressure in lbs. per sq. in.	Corresponding Temperature, Fahrenheit.	Pressure in lbs. per sq. in.	Corresponding Temperature, Fahrenheit.
10	192.4	65	301.3	140	357.9
15	212.8	70	306.4	150	363.4
20	228.5	75	311.2	160	368.7
25	241.0	80	315.8	170	373.6
30	251.6	85	320.1	180	378.4
35	260.9	90	324.3	190	382.9
40	269.1	95	328.2	200	387.3
45	276.4	100	332.0	210	391.5
50	283.2	110	339.2	220	395.5
55	289 3	120	345.8	230	399.4
60	295 6	130	352.1	240	4 3.1

[From The Scientific American.]

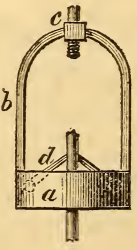
RELATING TO PATENTS.

IT may be well for parties who are interested in new inventions to remember that our firm of Munn & Co. have taken out far more patents, and have, therefore, had much greater experience in the profession, than any other agency in the world. Those who confide their business to us may therefore rely upon having it done in the best manner on the most moderate terms.

In addition to these advantages, we make it a general rule to assist the interest of our clients by giving publicity in the form of editorial notices, of all the new and meritorious inventions that are patented through our agency. The fact that we have carefully studied these improvements during the process of preparing the patent papers, enables us to speak knowingly in regard to their best features. The publicity thus given to inventions, owing to the immense circulation of The Scientific American among intelligent readers, is often of the utmost benefit to patentees. In some cases it has engaged the active coöperation of enterprising capitalists and manufacturers, in patents which otherwise would have remained dead, and has resulted in the most important pecuniary advantages to inventors and patentees, as hundreds of them are ready to testify; although the sum total of our charges for preparing their patent papers has rarely exceeded the small amount of twenty-five dollars. Whatever carping, jealous, or envious persons, or little agents, may say to the contrary, we are justified in affirming that all who really wish to promote their own interests will do well to employ The Scientific American Patent Agency.

[From The Scientific American.]

TOOL FOR DRAWING BROKEN PUMP-RODS.



We publish herewith an illustration of a very convenient little tool for drawing broken pump-rods or drills for oil-wells, which have slipped down out of reach. It is simply an iron ring, *a*, with a bail, *b*, on it, having a thread tapped in the square top, *c*. There are two pawls, *d*, in the ring, jointed so that they move easily, and of such length that they will be about one fourth of an inch less in diameter than the size of the broken rod. When this apparatus is let down, the pawls slip over the rod, and when the whole apparatus is lifted by a rope or wire, the pawls bite on the broken drill or other object, and hold it firmly, so that there is no escape. This tool is cheaply made, and will be found serviceable.

ALL ABOUT NAILS.

The following table will show any one, at a glance, the length of the various sizes, and the number of nails in a pound. They are rated, "3-penny up to 20-penny." The first column gives the number, the second the length in inches, and the third the number per pound. That is:

3-penny,	1 inch,	557 nails.
4-penny,	1¼ inches,	353 nails.
5-penny,	1¾ inches,	232 nails.
6-penny,	2 inches,	167 nails.
7-penny,	2¼ inches,	141 nails.
8-penny,	2½ inches,	101 nails.
10-penny,	2¾ inches,	68 nails.
12-penny,	3 inches,	54 nails.
20-penny,	3½ inches,	34 nails.
Spikes,	4 inches,	16 nails.
Spikes,	4½ inches,	12 nails.
Spikes,	5 inches,	10 nails.
Spikes,	6 inches,	7 nails.
Spikes,	7 inches,	5 nails.

From this table an estimate of quantity and suitable sizes for any job of work can be easily made.

MECHANICAL MOVEMENTS.

In the construction of models, or machinery, the skilful mechanic and inventor will study to avoid clumsiness in the arrangement of parts, and will naturally take pride in selecting, as far as possible, the simplest and best forms of mechanical movements.

To this end we have thought that nothing could be more suggestive or useful than a comprehensive exhibition of many of the best mechanical forms already known.

After much labor and expense, we have brought together, condensed and engraved expressly for this work, one of the most extensive series of mechanical movements ever before published.

Here the mechanic may find at a glance the movement suited for his purpose, and may see the separate parts best adapted to any special combination of mechanism.

As these engravings are not readily to be found elsewhere, we recommend the careful preservation of this book.

DESCRIPTION OF THE MECHANICAL MOVEMENTS BY NUMBERS.

1. *Cylinder Coupling.* Serves to connect the cylindrical ends of two shafts.

2. *Claw Coupling.* Cross-pieces are mounted on the ends of the shafts; the ends of one of these cross-pieces turned; and if the two shafts are brought close enough together, the ends or claws of the last-named cross-piece catch over the edge of the first cross-piece, and compel the same with its shaft to rotate.

3. *Lever Coupling.* On the driving shaft, a disk with spurs is mounted, and to the shaft to be driven a lever is hinged. By causing this lever to catch in the spurs of the disk, the coupling is effected.

4. *Spur Coupling.* Similar to No. 3.

5. *Knee Coupling* will be understood from figs. 5 and 26, the latter being a side elevation of this device.

6. *Universal Joint.* Serves to connect shafts running in oblique directions.

7 and 8. *Coupling* constructed of two disks with spurs, and intervening sleeve with radiating bolts; the disks are secured to the adjoining ends of the shafts to be coupled, and their spurs catch from opposite sides on the radiating bolts.

9 to 12 are devices for throwing machinery in or out of gear.

9. *The Bayonet*, composed of a drum, which revolves freely, on the shaft being turned by a belt, and not allowed to shift in a longitudinal direction. It is provided with two spurs. The prongs of the bayonet pass freely through holes in a drum, which is firmly keyed to the shaft. By moving the bayonet toward the revolving drum, its prongs catch behind the spurs of said drum, and cause the shaft to revolve.

10. *The fast and loose pulleys* require no further explanation.

11. *Sliding Gear.* The journal-boxes of one of the wheels are movable, allowing to throw said wheel in and out of gear.

12. *Friction Clutch.* By lightening or releasing a steel band, encircling a pulley on the shaft, the machinery is thrown in or out of gear.

13 and 14. *Brakes:*

13. *Brake by means of levers and shoes.* The shoes are pressed up against the circumference of the wheel.

14. *Friction Brake*, by a strap which passes round the wheel, and can be drawn up tight by means of a weight secured to the end of a lever, and supported, if the brake is not in use, by a hook-catch. A suitable rope serves to release the weight, and to put on the brake.

15 and 16. *Devices for converting motion* by means of sheaves, whereby the direction of the rectilinear motion is changed.

17. *Spiral Flange* on a shaft, to convert rectilinear motion produced by a constant power acting in a rectilinear direction, into a revolving motion.

18, 19, and 20. *Devices for converting reciprocating rectilinear into rotary motion.*

18. The reciprocating rod connects with links which are

provided with pawls, catching into ratchet-teeth in the wheel, to which a rotary motion is to be imparted. When the rod moves in one direction, one of the pawls acts; and when the rod moves in the opposite direction, the other pawl acts in the same direction as the first.

19. The reciprocating rectilinear motion of a rod is converted into a continous rotary motion of the fly-wheel by a weight suspended from a cord, which passes over a small pulley that connects with a treadle, from which the motion is transmitted to the fly-wheel.

20. Represents a device constructed on the principle of "flying horses," used in fairs for amusement. By pulling the cords radiating from the crank, the persons occupying the seats or horses on the ends of the arms are enabled to keep the apparatus in motion.

21 and 22. *Devices for converting reciprocating rectilinear into reciprocating circular motion.*

23 and 24. *Devices for converting continuous rotary into continuous rectilinear motion*, the former by a differential screw, and the latter by cog-wheels and double rack.

25. *Quadrat Coupling.* The ends of the two shafts are square, and united by a square sleeve.

26. *Race Coupliug.* Side elevation of the coupling represented by fig. 5.

27. *Device for throwing a machine in and out of gear*, consisting of a sliding pulley, with spurs which catch on arms extending from the shaft, and rigidly attached thereto.

28. *Roller-Brake*, which consists of roller mounted in an elbow-lever, and arranged so that it can be made to bear on a strap, and to cause the same to transmit motion from one shaft to the other. If the tightening pulley is taken off, the driven shaft stops.

29. *Chain and Chain-Wheel* for converting rectilinear into circular motion, or *vice versa.*

30. *Converting Reciprocating Rectilinear into Reciprocating Circular Motion*, by means of two toothed racks, gearing on opposite sides into an intermediate cog-wheel.

31. *Cog-Wheels with oblique teeth.*

32. *Worm and Worm-Wheel.* These two devices are intended to convert continuous rotary into continuous rotary

motion, or to transmit motion from one shaft to another shaft running in a different direction.

33 and 34. *Coupling with Claws.* A lever hinged to a disk-wheel is mounted on the end of one shaft; is so arranged that it can be thrown in gear with notches in a disk secured on the end of the other shaft.

35 and 36. *Coupling* consisting of two plates or disks, one of which is provided with two projections, and the other with corresponding cavities.

37. *Coupling* consisting of two disks, which are secured together by means of screw-bolts.

38. *Coupling* for vertical shafts.

39. *Coupling for Vertical Shafts*, in which the upper shaft is provided with a square socket, to drop on the corresponding square end of the lower shaft.

40. *Coupling for Vertical Shafts*, in which the lower shaft is provided with a fork, and the upper with a projection to extend in the fork.

41. *Friction Clutch*—is a face-view of the device shown in Fig. 12.

42. *Friction Cone*—explains itself.

43. *Friction Gear*—requires no further explanation.

44. *Self-releasing Coupling*—consists of two disks with oblique teeth. If the resistance to the driven shaft increases beyond a certain point, the disks separate.

45. *Hoisting Apparatus*, or device for converting continuous rectilinear motion into continuous rectilinear motion in another or parallel direction.

46. *Device for changing motion* by a bell-crank lever.

47. *Device for converting continuous* rectilinear motion into rectilinear reciprocating motion, by means of a zigzag groove.

48. *Device for converting continuous* rectilinear into continuous rotary motion by chain-wheel and chain.

49. *Device for converting rectilinear reciprocating* into continuous rotary motion — will be understood from the drawing.

50. *Device* for the same purpose as the previous figure.

51. *Device* for converting rectilinear reciprocating into continuous rotary motion by means of a reciprocating dou-

ble rack, the teeth of which are in different planes, and gear into pinions mounted side by side on the fly-wheel shaft. Said pinions connect with the shaft by ratchet-wheels and pawls, so that when the double rack moves in one direction, one of the pinions is rigid with the shaft; and when the rack moves in the opposite direction, the other pinion is rigid, and a continuous rotary motion is imparted to the fly-wheel shaft.

52. *Device for converting reciprocating rectilinear* into reciprocating revolving motion by means of a rack and pinion.

53. *Device for converting continuous revolving into rectilinear reciprocating motion.* A series of pins projecting from the side of revolving plate, act on a lip projecting from the under surface of a carriage, which rolls back and forth on wheels. By the action of the pins on this lip, the carriage is moved in one direction, and by the action of said pins on an elbow-lever, it is moved in the opposite direction.

54. *Device for raising the vertical rod*, and imparting to it an intermittent rising and falling motion. Commonly used in stamp-mills and other works.

55. *Device for imparting a reciprocating* rectilinear motion to a toothed rack.

56. *Device for imparting a reciprocating rectilinear motion* to a bar by means of an eccentric pin projecting from the side of a revolving disk, and catching in an oblong slot.

57. *Device for converting reciprocating rotary into continuous rotary motion*—consists of the ordinary working-beam and fly-wheel.

58. *Device for imparting to a pump-rod, or other portion of a machine, a reciprocating rectilinear motion* by an eccentric disk, mounted on the fly-wheel shaft, and acting on friction-rollers, secured to the rod or frame—will be fully understood by referring to Figs. 81 and 104.

59. *Ordinary crane for hoisting.*

60. *Friction Gear*, being side and plan views of 43.

61. *Device for converting continuous rotary into reciprocating rectilinear motion* by the action of a pinion, the axle of which slides up and down in a slotted frame, and which acts on the endless rack.

62. By the action of a revolving cam, a rising and falling or a reciprocating rectilinear motion is imparted to a stationary drum.

63. *Device for imparting a reciprocating rectilinear motion* to a frame by means of an internal endless rack, and a revolving pinion.

64. *Device for imparting a reciprocating rectilinear motion* to a toothed rack by a toothed segment secured to a lever-arm, which is subjected to the action of a weight, and of an eccentric wristpin, projecting from the side of a revolving disk.

65. *Device for imparting a reciprocating rectilinear motion* to a rod, from which is suspended a rocking-lever, connecting with eccentric wristpins. The wheels are of different diameters, and consequently the rod has to rise and fall as the wheels revolve. (See also Fig. 110.)

66. *Device for converting continuous revolving into reciprocating rectilinear motion* by an eccentric and elbow-lever.

67. *Heart-shaped Cam*—applied to impart to a rod a reciprocating rectilinear motion.

68. *Converting continuous revolving into rectilinear reciprocating motion*, by an endless segmental rack and pinion, the axle of which revolves and slides in a slot toward and from the centre of the segmental rack. This rack is secured to a disk, and a rope wound round said disk, and secured to the body to which a reciprocating motion is to be imparted, serves to produce the desired effect.

69. *Elliptic or oval gear.*

70. *Bevel gear.*

71. *Worm and Worm-Wheel.*

72. *Device for transmitting motion from one axle to another*, with three different velocities, by means of toothed segments of unequal diameter.

73. *Device for converting continuous revolving into reciprocating revolving motion* by a cam-disk acting on an oscillating lever.

74. *Device for imparting an intermittent revolving motion* to a shaft on which are mounted two pinions, which gear

alternately into a segmental gear-wheel, mounted on the end of the driving-shaft.

75. *Device for converting reciprocating revolving into continuous rectilinear motion* by an oscillating lever, carrying two pawls which engage with ratchet-teeth cut into the edges of a bar to which the rectilinear motion is to be imparted.

76. *Device for converting reciprocating revolving into reciprocating rectilinear motion*, by an oscillating lever, which connects by a link with the rod to which a rectilinear motion is to be imparted.

77. *Device for converting reciprocating revolving into continuous revolving motion*, by an oscillating lever, carrying two pawls, which gear in the teeth of a ratchet-wheel.

78. *Common Treadle*, for the purpose of converting oscillating into continuous rotary motion.

79. *Combination of revolving and rectilinear motions*, intended for the purpose of describing on a revolving cylinder a spiral line of a certain given pitch, which depends upon the comparative sizes of the pinion and bevel-wheels.

80. *Device for marking a spiral line* in which the graver is moved by a screw.

81. The motion of the eccentric disk produces a rising and falling motion of the frame. (See Fig. 58.)

82. *Reciprocating motion of a Plunger.*

83. *Reciprocating motion of a Cross-Head.*

84. *Reciprocating rectilinear motion* of a rod guided by friction-rollers.

85. Device for converting continuous revolving into reciprocating rectilinear motion, by means of roller-arms, extending from a revolving shaft, and acting on lugs projecting from a reciprocating frame.

86. *Ordinary crank motion.*

87. *Reciprocating motion*, produced by the action of a toothed wheel on a spring bar.

88. *Rising and falling motion of a hammer* or weight suspended from a rope which is secured to a drum that turns freely a shaft. The shaft carries a tappet, which catches against a hook hinged to the drum, so as to carry said drum along and raise the weight. When the drum has

reached its highest position, the shank of the hook strikes a stationary pin, and thereby the hook is caused to disengage from the tappet, and the weight drops.

89. *A reciprocating motion is imparted* to a rod by means of a groove in an oblique ring secured to a revolving shaft.

90. *Double-crank motion.*

91. *Cam groove* in the periphery of a drum, to produce a reciprocating motion of a rod or weight.

92. *Transmitting motion by means of belts and pulleys.*

93. *Transmitting motion by pulleys, belts, and internal gear.*

94. *Device for converting continuous rotary into intermittent rotary motion* by a rod suspended from a crank and carrying a cog-wheel. As the rod moves up and down, the teeth of the cog-wheel come in contact with a pawl, and an intermittent rotary motion is imparted to said wheel.

95. *Device for transmittting motion from two axles to another* by intervening bevel-wheels. By turning the horizontal axles with different velocities, the middle wheel is caused to revolve with the mean velocity.

96. *Device for converting reciprocating circular into continuous circular motion* by the action of an oscillating lever on a cam groove in the side of a disk.

97. *Lazy tongs for elevating*, etc.

98. *Device for converting reciprocating revolving into rectilinear revolving motion* by the action of an oscillating segment from which a belt extends over two pulleys.

99. Device which is also intended for converting oscillating into reciprocating rectilinear motion by a cam-slot in the end of the oscillating lever, which catches over a pin projecting from one of the sides of a parallelogram which is connected to the rod to which a reciprocating motion is to be imparted.

100. Device for converting the oscillating motion of a working beam into the continuous rotary motion of a fly-wheel and its shaft.

101. *Device for converting the oscillating motion* of a treadle into continuous rotary motion of a crank-shaft and an oscillating motion of a pulley.

102. *Double-acting Working Beam.*

103. *Single-acting Working Beam.*

104. Device for converting continuous revolving into intermittent rectilinear motion by an eccentric disk acting between two friction-rollers, as described under Figures 58 and 81.

105. *Device which serves to steady the piston* of an engine or pump by the action of a slotted guide-piece, which is operated upon by an eccentric on the driving-shaft.

106. *Device for imparting a rectilinear motion* to a pump-rod by two toothed segments.

107. *Device for imparting a rectilinear motion to a piston-rod* by two cog-wheels of equal diameter, provided with a crank of the same length, and connecting by links with a cross-bar to which the piston-rod is secured.

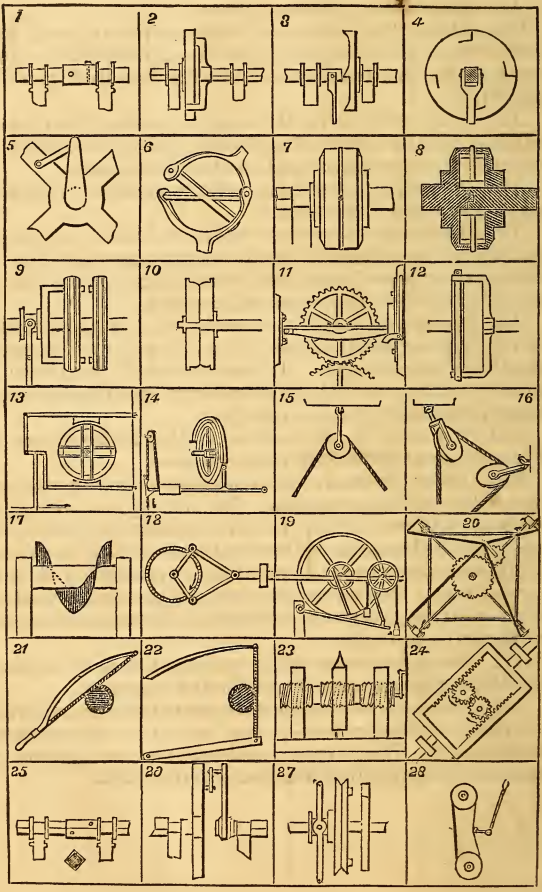
108. *Device* for a rectilinear motion of a piston-rod based on the hypocycloidal motion of a pinion in a stationary wheel with internal gear. If the diameter of the pinion is exactly equal to one half the diameter of the internal gear, the hypocycloid becomes a right line.

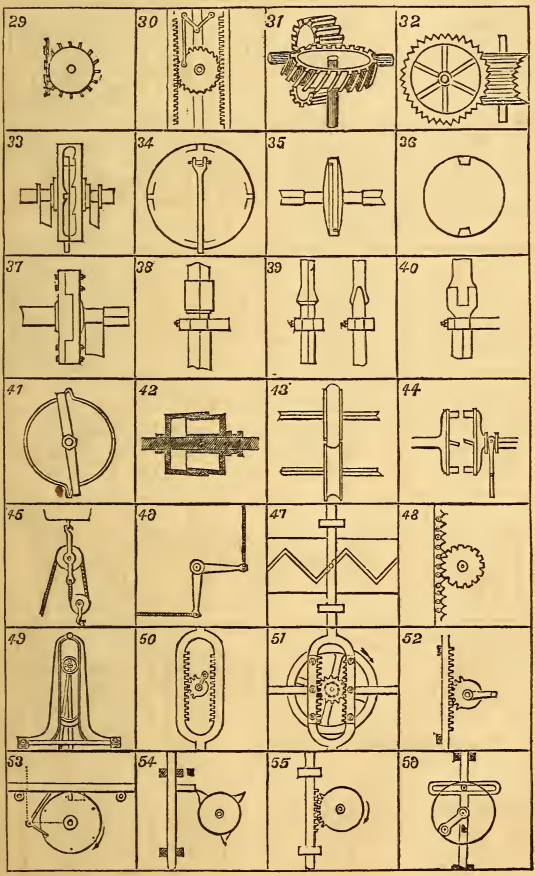
109. *Is similar in construction* to the device shown in Figure 56, and used for the same purpose.

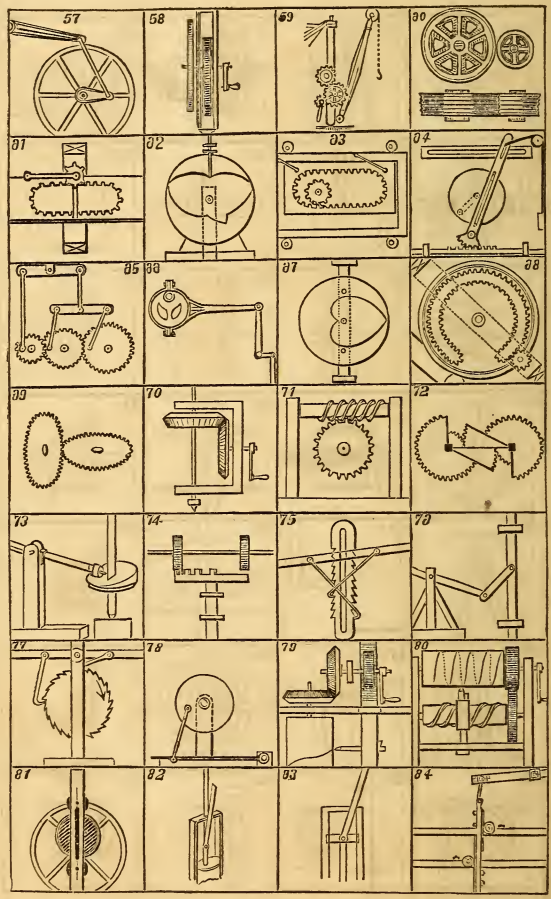
110. *Device for converting continuous revolving into reciprocating rectilinear motion.* The rod shown on top, to which a rectilinear motion is to be imparted, is moved up and down by the action of two crank-pins secured in wheels of different diameters, and connecting by suitable rods with a cross-beam. The rod receives a double motion, the nature of which depends upon the proportion between the diameter of the two cog-wheels.

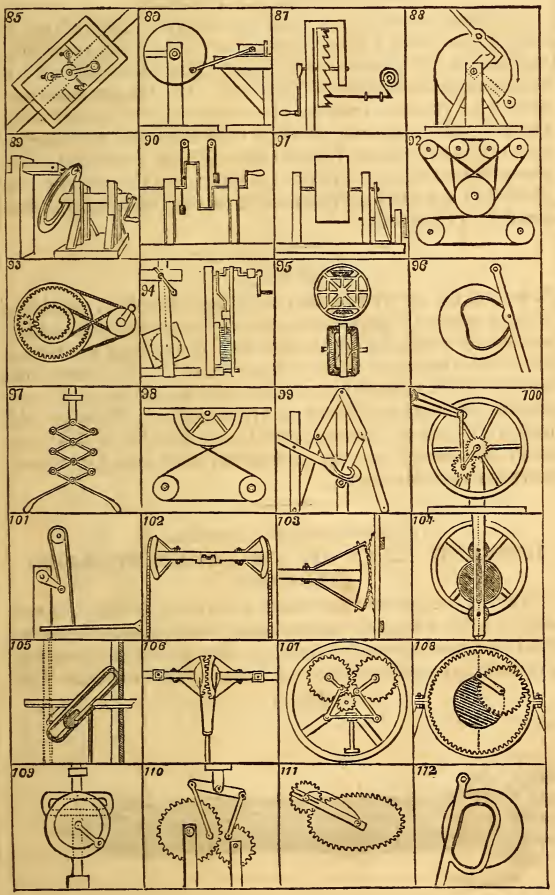
111. *Device for transmitting revolving motion* by a circular sliding pinion gearing in an elliptical cog-wheel.

112. *Device for converting continuous revolving into reciprocating revolving motion*—is similar to the device shown in Figure 96. The lever is provided with a cam groove to receive a pin projecting from the revolving disk.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28


29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56


57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84


85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112

SOUTHERN PATENTS.

A CORRESPONDENT, residing in Georgia, states that he took out a United States patent previous to the rebellion, and desires to know how his rights have been affected by the attempted secession of his State. For the general benefit of all patentees residing at the South, we remark that they are still valid, and all who hold them can exercise the same rights in them as before the rebellion; provided such patentees or assignees are not excluded by the terms of the President's Amnesty Proclamation, or the Confiscation laws passed by Congress.

ZINC,

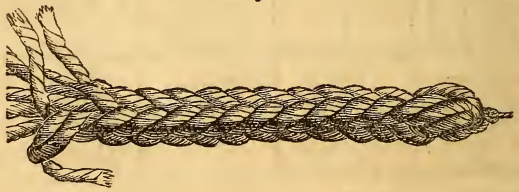
WHEN cold, is very brittle, but when heated to within a certain range of temperature, it becomes quite malleable, and may be rolled into thin sheets. It retains the malleability thus acquired after it becomes cold. It is a curious fact that, if this metal be carried beyond the range of temperature alluded to, it becomes brittle again. When in this range, it becomes ductile, as well as malleable. The discovery of these facts has introduced this metal to very numerous valuable uses.

[From The Scientific American.]

HOW TO LAY UP AN EIGHT-STRAND GASKET.

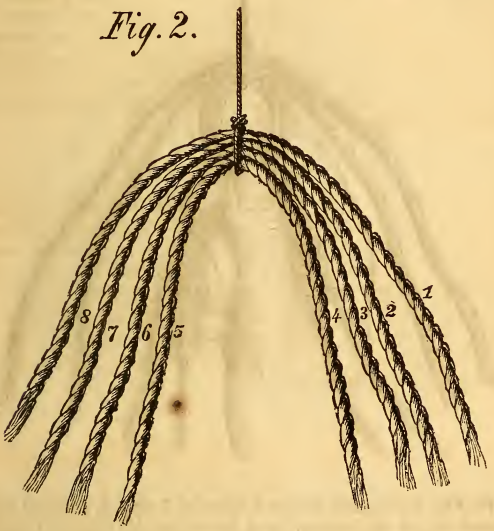
MANY an engineer who makes his own packing is contented to use a simple three-strand, loosely-plaited gasket, for all purposes whatever, from packing a simple governor-valve-stem, up to the piston rod, or air-pump bucket. Be-

Fig. 1.



lieving as we do that an eight-strand gasket is much superior to the ordinary kind, that it will wear longer, is a better shape to conform to its situation, and that it requires less compression from the gland to bring it up against the rod,

Fig. 2.

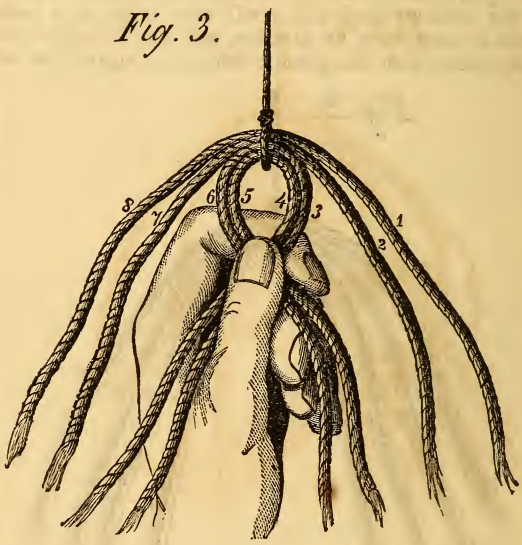


we have here illustrated the gasket itself, and also the principle of laying it up. We have endeavored to make both the article and engravings simple and clear, and hope that the practical engineer will derive some benefit from our exposition.

Fig. 1 is the gasket as it appears finished, and immediately below, in Fig. 2, is given the first step toward forming it.

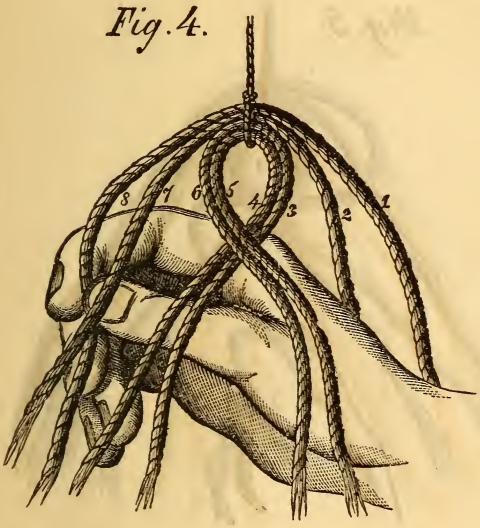
The operator takes eight strands, as shown. These are tied in the centre, and numbered, for the convenience of the reader, from 1 to 8.

Fig. 3.



In Fig. 3 we have the two strands, 3 and 4, crossed under 5 and 6, and the thumb and forefinger of the left hand represented as closing upon these strands to retain them in place. In Fig. 4 we have the real commencement of plaiting the gasket, and here is the point where the principle is first employed. This principle is that the strand, whatever one it may be the operator has hold of, *must pass under all the strands, and over two strands.* This is the key to the whole matter. It must also be borne in mind that *the top strand* of all on each side, is the one to be taken hold of alternately. In Fig. 4, the finger and thumb of the right hand are shown grasping the strand No. 8; the left hand being supposed to hold the crossed strands. Now look at the hand that grasps strand No. 8; it is inserted between

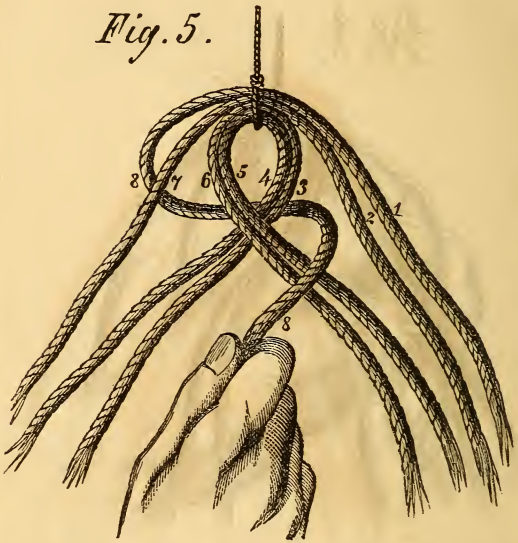
Fig. 4.



strands 2 and 5 and is *behind* all the strands except 1 and 2; therefore, when strand No. 8 is brought under all the strands except 1 and 2, and over strands 5 and 6, it will appear as in Fig. 5, where strand No. 8 is shown drawn around, but not up to its place; the fingers of the right hand grasp it, and the left hand keeps the crossed ones, 3, 4, 5, 6, together.

In the next figure, which is 6, the strand No. 8 is shown loosely drawn up to its place; the operator's hand going under all the strands for No. 1. This strand is to be brought *under* and behind all the other strands, and in between strands 3 and 4 where the hand enters, and thence over 3 and 8, as shown in Fig. 7. Thus the principle of this gasket is illustrated, for it is only necessary to go be-

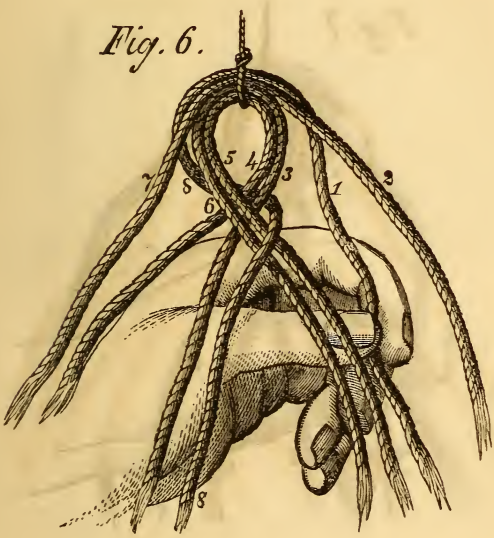
Fig. 5.



tween each alternate set of strands on either side—to take the topmost strand alternately, and to lay it over two strands, to make a hard, firm, and even piece of packing.

Some engineers prefer to use a central core of india-rubber plaiting the strands over and about it, so that the rubber, exerts its elastic force, but is not injured by the heat and grease of the machinery. This can be done very easily with the eight-strand gasket by merely allowing the rubber to occupy a central position between the strands, four on one side and four upon the other; the rubber must be cut square and to the proper size, and when it is overlaid with the strands it should be larger than the recess in the stuffing box, so that it will have to be compressed in order to get it

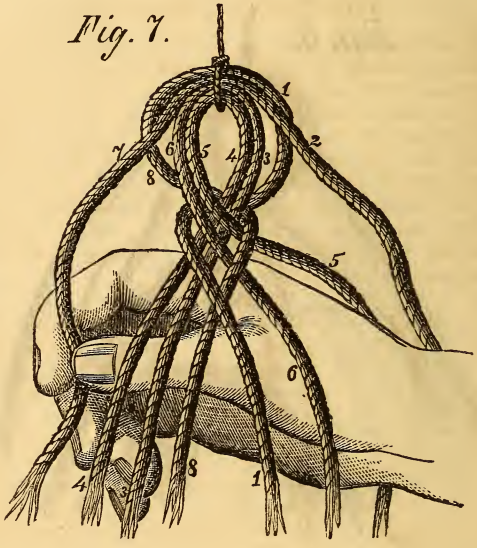
Fig. 6.



in; it will then tend to cling about the rod and wear a long time with good usage.

Let the beginner not be discouraged at the first trial if he does not succeed, for the process is, in reality, a simple one, and inexperienced persons have made gaskets from these drawings at the first trial. The gasket should be laid up while reading this description, and we hope all points are made clear and simple, so that a little practice will, as in all other cases, render the braiding of a square gasket as easy as one of three strands.

Fig. 7.



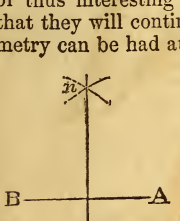
To the Editors of The Scientific American :

In your inestimable publication, exclusive of the valuable information which it constantly conveys to the studious mind, I often find remarks which—to use a plain expression—"hit the nail on the head." I now find, on page seventy-one of the present volume, these lines: "The greatest discoveries have been made in leaving the beaten tracks of science and going into the by-paths. Let inventors mark this sentiment well." Permit me to say that, in my opinion, there are many, like myself, who will consider that the above sentiment is the truth well spokenin a few words.

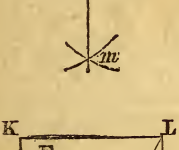
New-Orleans, La. JOHN H. MARTINSTEIN.

PRACTICAL GEOMETRY.

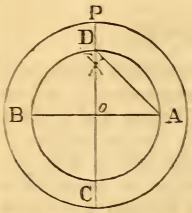
A KNOWLEDGE of geometry, both practical and theoretical, is of importance to mechanics and inventors. It is promotive of truth and patience in mental habits, and leads to the exercise of nicety and exactness in the execution of mechanical labors. With a pair of dividers, a rule and pencil, any person may speedily acquire a considerable knowledge of practical geometry. We subjoin a few simple and generally useful problems for practice, in the hope of thus interesting some of our readers in the subject, so that they will continue the study. Complete works on geometry can be had at the book-stores.



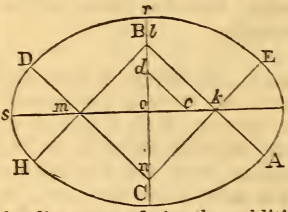
Problem 1.—To divide a line into equal parts.—To draw a line perpendicular to another: With a pair of dividers from the extremities of the line A B as centres, with any distance exceeding the point where the line is to be intersected, describe arcs cutting each other as *m n;* then a line drawn through *m n* will divide the line A B equally, and will also be perpendicular thereto.



Problem 2.—To find the side of a square that shall be any number of times the area of a given square: Let A B C D be the given square; then will the diagonal B D be the side of a square A E F G, double in area to the given square A B C D; the diagonal B D is equal to the line A G; if the diagonal be drawn from B to G, it will be the side of a square A H K L, three times the area of the square A B C D; the diagonal B L will equal the size of a square four times the area of the square A B C D, etc.



Problem 3.—To find the diameter of a circle that shall be any number of times the area of a given circle: Let A B C D be the given circle; draw the two diameters A B and C D at right angles to each other, and the cord A D will be the radius of the circle *o* P, twice the area of the given circle nearly; and half the cord will be the radius of a circle that will contain half the area, etc.



Problem 4.—To describe an ellipsis, the transverse and conjugate diameters being given: From *o*, as a centre, with the difference of the transverse and conjugate semi-diameters, set off *o c* and *o d*; draw the diagonal *c d*, and continue the line *o c* to *k*, by the addition of half the diagonal *c d*, then will the distance *o k* be the radius of the centres that will describe the ellipsis; draw the lines A B, C D, C E, and B H, cutting the semi-diameters of the ellipsis in the centres *k* B *m n*; then with the radius *m s*, and with *k*, and *m* as centres, describe the arcs D H and A E; also, with the radius *n r*, and with *n* and B as centres, describe the arcs E H and A H, and the figure A E D H will be the ellipsis required.

THE "SCIENTIFIC AMERICAN."—"It is hardly necessary for us to speak of its merits to those who are thoroughly posted up in the improvements of the age; but the general reading public may not be so well aware that it contains the finest engravings of all the late inventions—the new monitors, army and navy weapons, vessels, forts, machinery of all kinds, military and civil, mechanical and agricultural—with essays from the most distinguished scholars upon prac-

tical philosophy, chemistry, and engineering. It is indispensable to every inventor. It is useful for every family and housewife. In short, it is the best scientific and mechanical journal in the world, and we cannot see how any chemist, architect, engineer, farmer, or mechanic can do without it. MUNN & Co., Publishers, 37 Park Row, New-York."—*Cass County Republican.*

VELOCITIES.

A HEAVY body falling from a height, for instance from a balloon, falls during the first second sixteen and a twelfth feet, three times as far the next, five times as far the next, and so on, with increasing velocity, in the ratio of the successive odd numbers seven, nine, etc.; hence it will fall twelve hundred feet in nine seconds, and three miles in thirty-one and one third seconds. A cannon-ball fired perpendicularly ascends with decreasing but falls with increasing velocity, and describes each portion of its path upward and downward, respectively, in identically the same period of time.

ACIDS.

As most oxyds are formed by the union of oxygen with metals, so most acids come from its union with substances which are not metallic. Thus aqua fortis, or nitric acid, is composed of oxygen and nitrogen; oil of vitriol, or sulphuric acid, of oxygen and sulphur; phosphoric acid, of oxygen and phosphorus, etc. And as oxygen unites in different proportions with a metal to form different oxyds, so it does with each of the metalloids, nitrogen, sulphur, etc., to form different acids. We have, therefore, nitrous and nitric acids, sulphurous and sulphuric acids, etc. When the name ends in *ous*, the acid has a less quantity of oxygen than when it ends in *ic*.—HOOKER.

CARBON.

ALL the varieties of coal—anthracite, bituminous coal, etc.—are nearly pure carbon. Plumbago or black-lead—called graphite by the mineralogist—contains not a particle of lead, but is crystallized carbon, having commonly a very little iron mingled with it.

PROPERTIES OF CHARCOAL.

Although charcoal is so combustible, it is, in some respects, a very unchangeable substance, resisting the action of a great variety of other substances upon it. Hence posts are often charred before being put into the ground. Grain has been found in the excavations at Herculaneum, which was charred at the time of the destruction of that city eighteen hundred years ago, and yet the shape is perfectly preserved, so that you can distinguish between the different kinds of grain. While charcoal is itself so unchangeable, it preserves other substances from change. Hence meat and vegetables are packed in charcoal for long voyages, and the water is kept in casks, which are charred on the inside. Tainted meat can be made sweet by being covered with it. Foul and stagnant water can be deprived of its bad taste by being filtered through it. Charcoal is a great decolorizer. Ale and porter filtered through it are deprived of their color, and sugar-refiners decolorize their brown syrups by means of charcoal, and thus make white sugar. Animal charcoal, or bone-black, is the best for such purposes, although only one tenth of it is really charcoal, the other nine tenths being the mineral portion of the bone.

Charcoal will absorb, of some gases, from eighty to ninety times its own bulk. This constitutes a protection to substances which are covered with charcoal; for gases are the grand agents in decay. The question arises as to what gives this power of absorption to charcoal. It is generally supposed that is owing to its great porousness. Charcoal is full of minute spaces, and is therefore intersected by numberless partitions. If these were spread out, they would constitute a surface, perhaps a thousand times larger than the external surface of the charcoal. As every point of this surface is a point of attraction, it is supposed to account for the enormous accumulation of gases in the spaces of the charcoal. But this accounts for it only in part. There must be some peculiar power in the charcoal to change, in some way, the condition of a gas of which it absorbs ninety times its own bulk. And, besides, it seems to show some sort of affinity for certain substances, in separating them from others.—*Hooker.*

NEW-YORK AND WASHINGTON.

THERE are perhaps no two cities in this country to which inventors and patentees are more frequently called, in the course of business, than New-York and Washington. For the convenience of our inventive friends, we subjoin a list of the principal objects and places of interest, which they should endeavor to see whenever they visit either place. Inventors will always be welcome at our offices in New-York or Washington; and we hope they will "walk in" without knocking. We shall be happy to give them any information. (See page 13.)

WASHINGTON.—PLACES OF INTEREST.

Arsenal.
Alexandria, Va.
Aqueduct.
Battle-Fields of Bull Run.
Congressional Cemetery.
Capitol and Grounds.
Georgetown Heights.
General Post-Office.
Government Insane Asylum.
Government Green-Houses.
Jackson's Statue.
Long Bridge.
Mount Vernon.
National Observatory
Navy Yard.
Navy Department.
Potomac Falls.
Presidential Mansion and Gardens.
Patent Office.
Scientific American Office.
Smithsonian Institute.
Soldier's Home.
Treasury Department.
War Department.
Washington Monument.
Washington's Statues.

NEW-YORK.—PLACES OF INTEREST.

Academy of Music.
Academy of Design.
Asylum for the Blind.
Astor Library.
Atlantic Docks.
Battery.
Bible House.
Blackwell's Island.
Central Park.
City Hall.
Cooper Institute.
Croton Reservoir.
Dry Dock.
Fort Hamilton.
Fort Lafayette.
Governor's Island.
Greenwood Cemetery.
High Bridge.
Hoboken.
Navy Yard.
Post-Office.
Scientific American Office.
Sub-Treasury.
South Street.
Staten Island.
Tombs.
Trinity Church.
United States Custom House.
Washington Monument.
Worth Monument.
Wall Street.
Washington Market.

GENERAL INDEX.

Acids,.....105
Alcohol, Force of,.....35
Amendments,.....23
Appeals,.....24, 69, 72, 74
Application for Patents,.....5, 77
Arsenic,.....34
Assignments,..7, 29, 30, 31, 32, 65
Assignees, Rights of,..26, 29, 30, 32
Austrian Patents,.....41
Belgian Patents,.....41
Bishop, Hon. W. D., letter,.....18
British Patents,.....41
Caveats,.....8, 33, 59
Charcoal, Properties of,.....106
Chemical Inventions,.....51
Circle, Problems,.....44
Commissioners, Letters of,.....18
Contested Cases,.....69
Copies of Patents,.....15, 54
Copyrights,.....14
Courts, Powers of,.....62
Cuban Patents,.....41
Designs,.....14, 76
Disclaimers,.....27, 65
Drawings,.....22, 65
Electric Spark,.....19
Electric Conductors,.....46
Examinations,.....6, 23, 56
Examiners-in-Chief,.....74
Extension of Patents....28, 63, 71
Fees, Official, Table of,.....76
Forfeited Cases,.....10, 80
Foreign Patents,.....29, 40
French Patents,.....41
General Information,.....7, 33
Going to Washington,.....15
Gaskets, how to lay,.....96
Geometry, Practical,.....103
Heat Conductors,.....50
Heat, Effects of, Table,.....20
Heirs of Inventor, Rights of,...58
Hints to Letter-Writers, ...38, 52
Holt, Hon. J., Letter,.....18
Horse Power,.....49
How to Invent,.....3
How to Obtain Patents.....5, 9
How to Sell Patents.....42
Income from Patents,.....44
Information, Official.....33
Infringements,.....16
Interferences,..... 25, 57
Invention, What it is,.....21
Inventor, Rights of,.....13, 29
Nails, Table of Sizes,.....82
New-York, Places of Interest,.107
Novelty of Inventions,..... ...34
Oath, to Patents,.....22, 67, 70
Official Rules, Patent Office,....21
Ownership in Patents,.....9
Partnership in Inventions,.....9
Patent Laws of the U. S.,.....53
Patent Office, Rules,.....21, 53
Patents, How to Obtain,...5, 9, 13
Patents, How to Sell,..... 42
Patents, Value of,.....45
Patents, Validity of,.....66
Patents on Small Things,.....45
Patents to Foreigners,.....50
Patents may be Divided,....26, 65
Patentee, Rights of,.....30
Penalty for Stamping,.....70
Power of Water,.....49
Principle, Claims for,.....22
Priority of Invention,...21, 25, 57
Prussian Patents,.....41
Pump Rods, Tool for,.....82
Quick Applications,.....13
Reïssues,.....26, 59, 66
Rejected Applications,..10, 33, 75
Remittances,.....11
Royalty,.....44
Rules, Patent Office,.....21
Russian Patents.....41
Secret Archives,.....24
Sound,.....20
Southern Patents,.....96
Spanish Patents.....41
Specification, the,.....22, 33
Steam Engine, the.....37
Steam, Pressure of, Table,.....80
Suits, Law Patents,.....60
Tracing Paper,.....35
Use, Prior to Patent,.....68
Useful Hints,.....52
Validity of Patents,.....66
Value of Patents,.....45
Vane, a Sparkling,.....46
Velocities,.....105
Washington, Places of Interest, 107
What Prevents a Patent,.....21
Where to go for Patents,..... .81
Who may obtain Patents,.....55

R D 174

OBBS BROS. INC.
JUN 83
ST. AUGUSTINE
FLA.
32084

LIBRARY OF CONGRESS
0 019 935 708 6